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ORAL HEALTH

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A New Year's Resolution

THE family Dentist, like the family Doctor, enters to a remarkable degree into the personal life of the family, and has the opportunity of exercising a helpful influence, particularly in the lives of the boys and girls.

The younger members of the family, while in the formative period, are ever ready to receive interesting, useful information and kindly suggestions.

The family Dentist may thus render greater service—*dental service plus*—by measuring up to the best traditions of the Dental Profession and, within the office, playing the part of the *good citizen* as well as that of the *good Dentist*.

The Editor offers this as a suitable New Year Resolution for Canadian Dentistry for 1924, and extends

SINCERE GOOD WISHES TO ALL



HONORABLE FORBES GODFREY, M.B., L.R.C.P. & S., M.P.P.
MINISTER OF PUBLIC HEALTH AND LABOR
PROVINCE OF ONTARIO

ORAL HEALTH

A JOURNAL THAT STANDS FOR THE "OUNCE OF PREVENTION," AS WELL AS THE "POUND OF CURE"

Vol. 14

TORONTO, JANUARY, 1924

No. 1

Health Centers of the Massachusetts-Halifax Health Commission

WITH SPECIAL REFERENCE TO PRESCHOOL-AGE DENTAL CLINICS AND NUTRITION CLASSES*

B. FRANKLIN ROYER, M.D.

*Executive Officer, Massachusetts-Halifax Health Commission,
Halifax, N.S.*

HEALTH center work in Halifax and Dartmouth came about as a direct result of the ship disaster occurring in Halifax harbor, Dec. 6, 1917, when the *Mont Blanc* and the *Imo* collided. The *Mont Blanc* was loaded with trinitrotoluene, and a great explosion resulted, destroying the lives of 1,635 citizens, and wrecking several thousand dwelling houses. Practically all buildings in the two communities were severely damaged, the property loss alone amounting to \$30,000,000. Immediately after the news reached Boston, citizens of Massachusetts hurried physicians and nurses to Halifax with relief and supplies. A very generous contribution of funds and supplies followed, the collection reaching almost \$750,000. In addition, several shiploads and several trainloads of supplies and the personal assistance of many citizens of Massachusetts were contributed. As soon as the governments of Canada and England could visualize the disaster, and make plans to give permanent relief, a commission was formed to handle relief in an official way and pay for all loss of life, limb and property.

With the formation of the government organization, and its

*Read before the Section on Preventive and Industrial Medicine and Public Health at the Seventy-Third Annual Session of the American Medical Association, St. Louis, May, 1922.

establishment on the ground, outside philanthropy was no longer needed. A quarter of a million dollars of the Massachusetts money remained unexpended at this time, and at the suggestion of the committee in Massachusetts, Dr. Victor G. Heiser studied local needs to determine how this large balance might be expended within the spirit of the donations, and for a need having some direct relation to the disaster. Dr. Heiser recommended that the money be employed in a campaign of public health education and preventive medicine, on condition that the government relief commission supplement it at the rate of \$15,000 a year for a period of five years, and that the City of Halifax and the Province of Nova Scotia each make contributions in facilities or money to the sum of \$5,000 a year, the Massachusetts money to be apportioned as needed over approximately a five-year period. This was agreed to by all organizations, and a new commission, known as the Massachusetts-Halifax Health Commission, was created under a special act of the Nova Scotia Legislature in May 1919.

Dr. Heiser recommended the establishment of health centers as a part of the constructive educational health campaign. It has been my privilege to work out on the grounds the details of this supplemental health programme in co-operation with the chief nurse of the commission, subject, of course, to the approval of the commission itself.

The child welfare clinics, the prenatal clinics, the ear, nose and throat services, the posture clinics, the venereal clinics and the tuberculosis services are organized very much along the lines now obtaining in the best health centers in other parts of the United States. Some medical advice is given and much public health counsel is offered both by physicians and by dentists, as well as by specially-trained public health nurses and nutrition workers.

Some new features, however, have been introduced in the preschool-age dental clinics, and in the nutrition clinics, that are worthy of special discussion at this time.

In making preliminary plans for a preschool-age dental clinic, we first submitted our views to the Halifax Dental Society. The Dental Committee on Public Health of this society agreed to the suggestion that the proper place for, and the place most likely to give results in, preventive dentistry, was in the preschool-age group, that is, up to 6 years. This committee agreed also with my suggestion that tooth nourishment should be featured out of all proportion to what has been done in health work in other places, and that prophylactic dentistry should be practised in co-operation with such an instructional service. While the matter was under discussion, a sub-committee secured approval of the Canadian Dental Society, and a delegate secured approval of the American Dental Association.

It is the teaching plan of these health center preschool-age dental clinics to begin featuring tooth nourishment in the prenatal period. We try to make the expectant mother appreciate that unless she takes food from which sound bone and good teeth may be built, her baby will not grow a sound, strong, well-enamelled set of temporary teeth, likely to remain sound and free from decay during the period of their natural use. We teach the mother to appreciate that the first set of teeth, even to the enamel, is pretty well finished when the child is born, although the teeth are under the gums in the jaw. We preach the use of liberal quantities of whole milk, the use of all leafy vegetables, even to raw cabbage, especially during the last six months of pregnancy. We aim to have the dentist in charge of this service advise with expectant mothers and the public health nurses, as well as the physician, in this prenatal service and nursing period.

We begin dentistry with the baby at 6 months, whether bottle-fed or breast-fed, and try to control the health of the baby from then until he is 6 years of age, by taking him to the preschool-age clinic for guidance, and to impress on the mother essential food lessons. The dentist in the clinic, and the public health nurse subsequently in the home, constantly keep before the mother the thought that, in this important period, the second teeth are being built and enamelled. We urge that, unless the child is given through these years also the kind of food from which sound teeth may be built, the permanent teeth may decay at any time after complete eruption or in the early 'teens. We teach continuously and constantly that unless the right kind of food is taken—chiefly mother's milk the first year, and modified milk or good whole milk later and, as soon as possible, leafy vegetables, oatmeal porridge and whole wheat bread—one cannot lay the foundation for strong teeth or good lasting enamel. We emphasize in the clinic and through the health nurse and visiting housekeeper, that tooth-feeding is of greater value than tooth-cleansing, but at the same time, we teach oral hygiene.

The dentist teaches the use of the tooth brush in prophylactic work, and mechanically cleanses when necessary. With children coming to the clinic who have been improperly fed and whose mouths have been neglected, much repair work naturally is done, the sort dentists refer to as patchwork. Silver may be deposited by precipitation, both in shallow cavities that have been previously cleaned, and as a coating to teeth losing their enamel, with the hope of preserving them and keeping their value in the development of the jaw. Fillings may otherwise be put in. Sinuses and diseased gums are treated.

The whole of this dental clinic service, however, is educational rather than reparative. We teach that tooth-feeding must begin

with the expectant mother and must be continued during the prenatal period. One of our slogans is: "A sanitary mouth with good oral habits at 6 is likely to remain a clean, healthy mouth at 60." We are fortunate in having a woman dentist, Dr. Arabelle MacKenzie, who has had a year of postgraduate training in the Forsythe Clinic at Boston. She is tactful in handling children, and fits in well in co-ordinating her work with that of the medical staff. We have given her the title of pedodontist. She now has more than 300 babies and children less than 6 years of age coming to this clinic four times a year for dental advice. The nurse during the latter half of the first year visits the baby fortnightly, and once a month, or oftener if required, during the entire preschool period.

The school dentists of Halifax have already voluntarily made special report to the school authorities of the notable changes observed by them in children entering school during the last session, who have had from one year to eighteen months in the preschool dental clinic.

The nutrition services of the health center are organized much along the lines of Emerson's clinic in Boston, with some features of other clinics added. We have the additional advantage that the nurses', physicians' and consulting clinics, including the ear, nose, throat, posture and tuberculosis services, are operated from the same building. During summer months, adenoid and tonsil clinics are also conducted. In this way, we are able to do much as Dr. Wile does at the Mount Sinai clinic, viz., ask that handicaps be removed so that, as Dr. Emerson says, the child may be free to gain. Tonsils and adenoids must often be removed before a child may make great headway in a nutrition class.

We are fortunate in the nutrition service in having Dr. F. W. Tidmarsh in charge, a man with an excellent overseas record and a period of study in Emerson's clinic. The physician is supported by the public health nurses and visiting housekeepers (nutrition workers), who aim to correct any home environment that may be detrimental to health. When nutrition problems are paramount, the visiting housekeeper does the bulk of the home teaching, the nurse going occasionally. The visiting housekeeper is trained to go into the home and teach the housewife the kind of food the child needs in order that it may gain. Not only does she explain the kind of food that is needed, but she goes with the mother into the shop or market and teaches her how to buy economically the kind of food the family needs, and the kind the particularly undernourished child needs.

The aim in the health center is to develop only one class of the undernourished of school age, recruiting this class chiefly from homes with open tuberculosis. This class is used for feature purposes and educational publicity. We recognize that the largest and the most

desirable places for nutrition classes must be, for some years at least, in the public schools. At present there are three such classes in the Halifax public schools.

Our larger aim is to give nutrition advice to undernourished children of the preschool age. In that period, children are not so commonly 7, 10 or 15 per cent. underweight, but there is quite as much need of nutrition advice alone, or combined with the advice of a pedodontist, as in the older groups. With these classes we aim to prevent gross malnutrition.

I have more fully described the larger health programme in other articles. It will suffice here to have elaborated somewhat on the special services of preschool-age dentistry, a service hardly started in health circles, and on nutrition classes running parallel with them, an innovation in health work until recently largely limited to the school-age period.

One fully organized health center is now operating in the northern part of Halifax, with a summer sub-station for weighing and measuring babies. A second health center, suited to the needs of a population of 8,000, is operating in Dartmouth.

The work of the first health center, when reviewed by representatives of the International Health Board of the Rockefeller Foundation, influenced them to " earmark " \$200,000 for building a Dalhousie health center for the south end of Halifax. This new health center is being planned for the university as an integral teaching unit of the medical school, and will serve as an out-patient department to the group of hospitals now growing up in the immediate vicinity of the medical school. With health center service for the southern half of Halifax conducted by the medical faculty from a university building, with public health nurses on the staff, students of medicine will be given great clinical opportunities and will here, for the first time, be given ample opportunity to study domiciliary causes of diseases, and a chance to acquire a better fundamental groundwork for preventive medicine.

The general scheme of organization and the general plan of operation can perhaps be set forth best diagrammatically. It would be described about as follows: The commission consists of nine men, three of them being members by virtue of their offices: the provincial health officer, the chairman of the Halifax City Health Board and the health officer of the town of Dartmouth. Two are appointed by the Halifax Relief Commission and four by the Massachusetts-Halifax Relief Committee of Boston. The commission acts under a special provincial law, and meets semi-monthly. Policies are determined by the commission, and work is directed through the executive officer and staff. The provincial and local health authorities are members of the commission for the purpose of co-ordinating

the established work of each with the new work undertaken by the commission. It is the aim and object of the commission to do such lines of health work as should properly come under the local health officials in each community, and to work in the closest co-operation with all privately endowed philanthropic and charitable agencies, so that a minimum amount of overlapping will occur and waste will be avoided.

The public health nursing programme is wholly constructive in character, and is a very large feature of the work. Each nurse is responsible for the entire public health programme in the district assigned to her, and for the health of every member of each family with whom she comes in contact. She seeks to remove as far as possible domiciliary causes of diseases, and to train and re-educate the family in right methods of living. Bedside nursing is done in emergency only, or for family demonstrations. The Victorian Order of Nurses does the routine bedside work in homes of both communities, and gives general family instruction during such intervals.

Studies in Root-Canal Sterilization*

JOHN A. MARSHALL, M.S., D.D.S., Ph.D., SAN FRANCISCO

Dr. Marshall presents in the following series of studies in Root-Canal Sterilization, a scientific treatise upon this important subject. The necessary experimental and research work was carried on by Dr. Marshall through grants from the local and National Dental Associations. ORAL HEALTH has considered these studies of such practical importance to the Dental Profession, that they have been grouped together and are published in this issue with expression of appreciation to the Journal of the National Dental Association for generous loan of electrotypes for illustrations.

STUDY NUMBER ONE

THE following report deals with an inquiry into the differences in histological structure of the organic matrix of the dentin and of the cementum, and constitutes the first part of a report upon the study of root-canal sterilization.

In preparing teeth for class-room work, it was noted that during the decalcification by acid, certain changes occur in the specimens which are not accounted for by the solution of the lime salts. From certain observed peculiarities, it was decided to determine to what extent this decalcification affected the organic portion of the tooth.

* (From the Research Laboratories of the Department of Dentistry, and of the George W. Williams Hooper Foundation for Medical Research, University of California)

The original plan of the experiment was to compare a ground section of a tooth with a section made from a decalcified specimen, for such a comparison would demonstrate the differences in the structure of the organic matrix from the structure of the ground section. Most authors agree upon the fact that the deposition of solid, inorganic portions of the tooth is made around the fine fibers of an organic matrix. For example, Noyes (1) states that the organic basis is formed first, and that "the inorganic salts are combined with it in a weak chemical union." Each tissue—enamel, dentin and cementum—is formed within its own matrix in a process which proceeds nearly simultaneously. Also, Mummery (2) and Von Ebner (3) have shown that this network in dentin is composed of a reticulum "of fine fibers of connective tissue, modified by calcification, and when that process is complete entirely hidden by densely deposited lime salts." Finally, Hopewell-Smith (4) states that these fibers are identical to those found in bone, not only chemically, but also morphologically. He finds it impossible "to determine where the one begins and the other ends." Although he does not state the fact, it is not unlikely that the author just quoted referred more particularly to the study of calcified, rather than decalcified sections. Experimental procedures to be described demonstrate that a separation between the matrix of the dentin and that of the cementum really occurs, and that definite histological differences exist between the two tissues.

METHOD OF STUDY

If a fully developed tooth is subjected to the action of dilute acids (nitric acid or hydrochloric acid), a solution of the inorganic material



Fig. 1—First stage in the separation of organic matrix of dentin from cementum. The border of the tissue near the gingiva has been loosened, and is rolled back. Figs. 1-6, inclusive, show the macroscopic characteristics of the two matrices.

is affected. The residue which remains consists of the individual matrices which preserve the general outline of the tooth. The size, of course, is quite considerably reduced, but the difference between the crown and root portion is readily recognized.

The technic of decalcification, or of the removal of hard portions of teeth, has been developed and described by others in some detail. It consists, essentially, in hardening the tissue for twenty-four hours by means of Zenker's fluid, or by 10 per cent. formalin dissolved in normal salt solution. The specimens are then washed, and gradually dehydrated in alcohol of varying concentrations (60%, 80%, 95% and absolute). In this treatment it has been noted that the usual time of twenty-four hours is insufficient for the thorough penetration into the portion of the tooth lining the pulp chamber, and it is necessary to lengthen this interval to forty-eight hours for each of the different strengths of alcohol used. Unless this is followed, the inner portion of the tooth does not "clear" well in xylol, and subsequent cutting results in mutilation of the tissue. For decalcification, the specimen is hydrated by carrying it through the different concentrations of alcohol from absolute to 60%, and finally washing in water. Decalcification is accomplished by immersing the teeth in a solution containing 1 gram phloroglucinol dissolved in 100 cc. of concentrated nitric acid, and this mixture diluted to 1 liter with a solution of 10 per cent. nitric acid. It is advisable to use a relatively large volume of acid as compared with the volume of the tooth, and 150 cc. of the acid solution have been used to decalcify a tooth weighing approximately 2 grams. The temperature of the solution in some instances was raised to $37\frac{1}{2}^{\circ}$ C., but it is preferable to choose a temperature of about 20° C., as, in my experience, less disintegration of the matrix takes place. Although freshly extracted teeth were used to advan-



Fig. 2—The outer matrix has been loosened to a greater extent.



Fig. 3—The cementum matrix has been separated from the dentin at both borders, leaving a portion of the tissue adherent in the middle portion.

tage, in some instances, in the experiments described, teeth which had been extracted for six months, but which had been kept immersed



Fig. 4—An enlargement in which the general texture of the organic matrix of the cementum may be observed. A portion of the matrix is still adherent to the tooth as shown at "A".

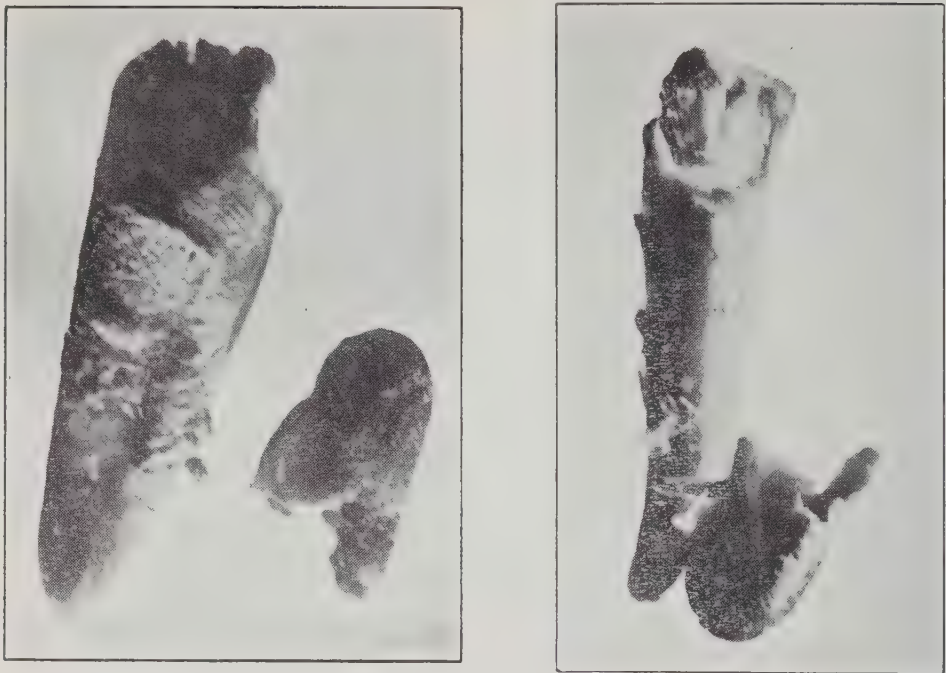


Fig. 5—The attachment of the outer tunic is severed, and the two tissues are shown in their relative positions.

in a mixture of glycerin and water, were decalcified without apparent injury to the matrix.

As a rule, teeth do not decalcify at the same rate of speed. It is, therefore, advisable to examine each specimen carefully at intervals of 12 hours. The decalcification, unless controlled, will eventually cause a disintegration of the organic tissue. To obviate this result, the tooth is removed from the acid and washed carefully in tap water until free from the re-agent. In my experience, the time of decalcification varies from 4 to 8 weeks, depending upon the size of the tooth, and, also to some extent, upon its age. Recently extracted teeth decalcify at a slightly more rapid rate.

THE RESULTS

The results of this study demonstrate three points:

- (1) That the matrix of the dentin may be separated from the cementum.
- (2) That the fibers of the dentin matrix run in a different direction from the fibers of the cementum matrix.
- (3) That there is a slight difference in the size of the two matrices.

Figures 1 to 6 illustrate the progressive stages which may be followed in the removal of the outer tunic of the cementum from the inner tunic of the dentin. A carefully graduated pressing and pulling motion must be so applied that the direction of the force is toward the apex of the tooth. The ease of the removal depends entirely upon the degree of the decalcification of the specimen. If the process has been of too long duration, or if the acids used have been too strong,



Fig. 6—The lingual aspect showing the complete separation of the two matrices.

or if the temperature has not been controlled, the outer tunic becomes so friable that it breaks readily in the fingers. The matrix of the dentin, also, loses firmness, and fractures upon the slightest pressure. On the other hand, if the decalcification has not proceeded to a

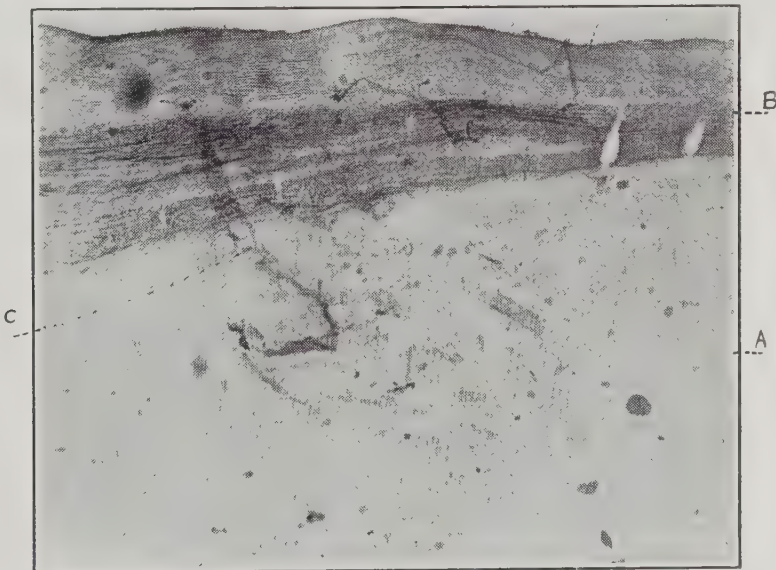


Fig. 7—A section from a decalcified tooth in which the matrix of the cementum is shown attached to that of the dentin. The difference in size of the fibers, as well as their relationship to each other, is shown at "A" and "B". Due to the great friability of the tissues, the section shown contains certain fibers in the field which have broken loose and which have assumed positions abnormal to the rest of the tissues. Such a condition is indicated at "C", the dark line of the fibers having an appearance of a "J". Figs. 7-10, inclusive, show the microscopic characteristics of the two matrices.

sufficient degree, the calcium salts still remaining in the specimen make a separation of the two tissues very difficult.

The microscopic study of the tissues shows structural characteristics which are more pronounced in the sections than in the photographs. The illustrations, however, are sufficiently clear to indicate that there is a very marked difference in the relative position of the fibers of the dentin matrix and those of the cementum matrix. In the *dentin*, the direction of the fibers usually appears to emanate from a series of central points. They are analogous to the spokes of a

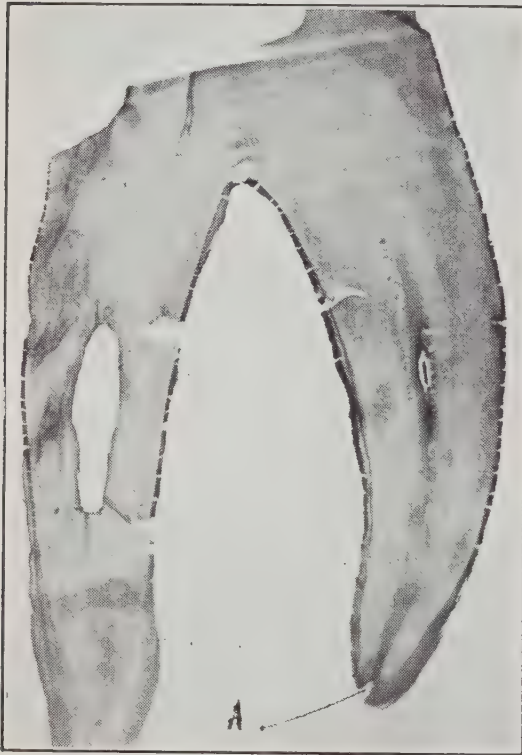


Fig. 8



Fig. 8A

Fig. 8—A photomicrograph of a longitudinal section of a molar tooth showing location of apical foramen in distal root. The section is 8 mm. in thickness. The difference between the cementum matrix and the dentin matrix is clearly indicated, especially in the region of the apex. Further up toward the bifurcation, the cementum matrix becomes so thin that it is hardly distinguishable in the microscopic section.

Fig. 8-A—Enlargement of specimen at "A" showing direction of cementum fibers and dentin fibers.

wheel, except that the distance between the fibers does not increase as the fibers proceed from the centre. In other words, the fibers parallel each other, and this parallelism is due, apparently, to a complicated anastomosis extending, presumably, from the pulp canal to the periphery of the dentin.

The fibers of the *cementum* present quite a different picture. In this case, they appear to run concentrically around the tooth, and in some sections, are at right angles to each other, as shown in Figure 7.

The difference in size of the fibers is not quite so apparent. The spaces between the fibers are greater, in many instances, in the

cementum than in the dentin, and this gives a background on which the cementum fibers appear larger than those of the dentin. This difference in size is not constant, due to the fact that so far it has not been found possible to bring the different specimens to the same stage of decalcification. Consequently, the fine fibrous network is either

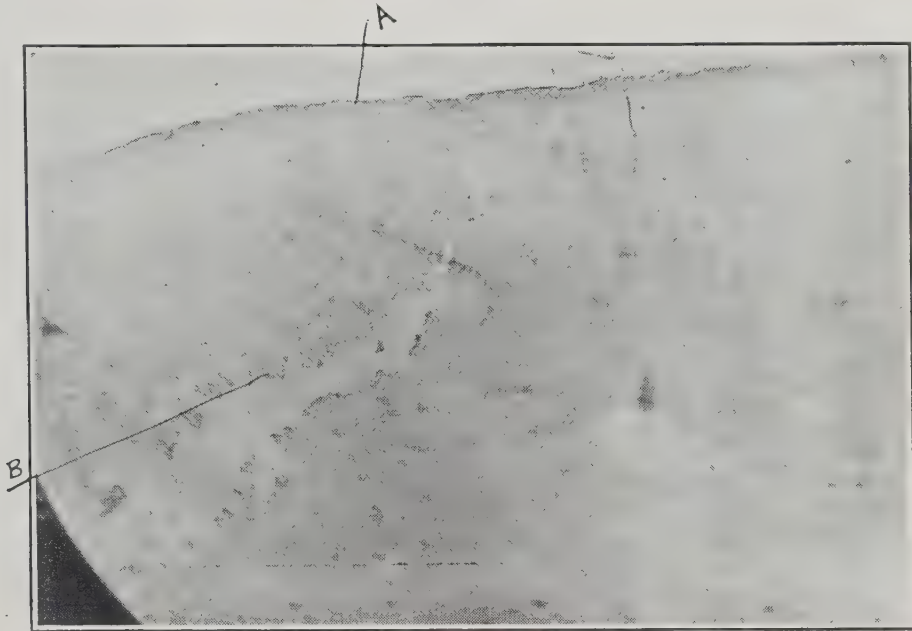


Fig. 9—A longitudinal section of a dentin matrix from which the cementum matrix has been separated. The dento-cemental junction is indicated at "A". A partial disintegration of the matrix has occurred at "B" where individual fibers have been demonstrated.

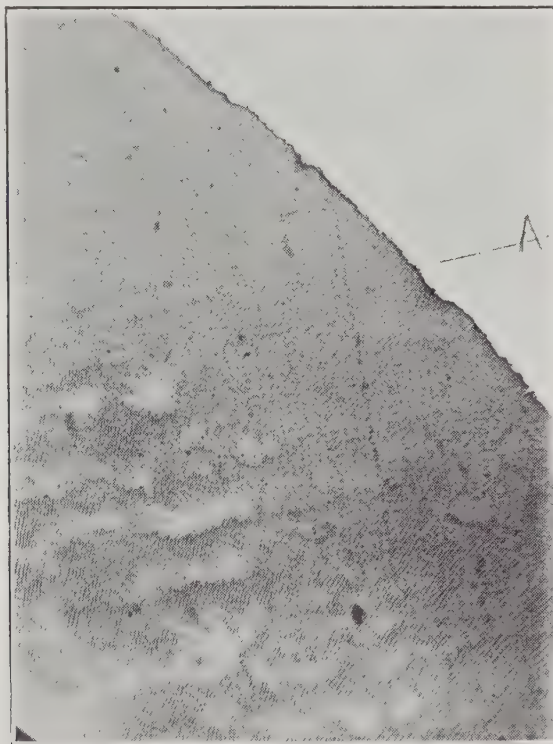


Fig. 9-A—A decalcified but not disintegrated dentin matrix. The cementum of the matrix has been separated along the border indicated at "A". Note the radical direction of the fibers throughout the section.

partially disintegrated, which makes the spaces between the fibers larger, or else, the decalcification has not been entirely completed and a portion of the inorganic material still remains. In the latter event, the spaces are, in some instances, indistinguishable. The extent to which the fibrous network may be destroyed is shown in Figure 10.

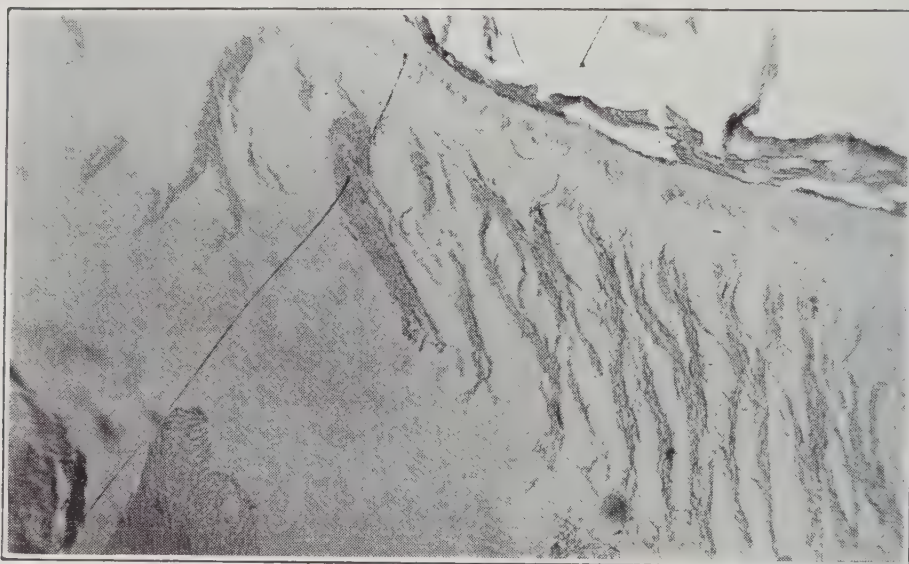


Fig. 10—Longitudinal section of partly disintegrated dentin matrix. The individual fibers may be seen broken away from the tissue.

It has not been possible to demonstrate in any of the sections a connection between the fibers of the dentin and the fibers of the cementum. They appear to be entirely different, not only in the direction in which they run, but, also, in their relative size. The fact that no connection between dentin and cementum exists, has already been demonstrated by Marshall (5) in experiments in which the tissues were stained by means of the vacuum principle. It was shown in these experiments that no connection exists between the ampulae of the dentin found in the Tomes layer and the lacunae of the cementum. This research upon the decalcified specimens would appear to substantiate that already accomplished by the author just quoted.

If the organic matrices of the dentin and cementum are connected, as has been supposed in the past, this connection would absolutely preclude the separation of the two tissues. Communication between the dentin and the cementum would be due to interlacing fibers which would provide channels of communication between the two tissues. Since the separation can be easily accomplished, it follows that the organic matrices of the dentin and of the cementum may be regarded as two distinct entities histologically different and with the exception of the apical foramen are without channels of communication.

The direct application of this research to root-canal technic and

to the problem of sterilizing dentin is to be made the subject of a separate article.

CONCLUSION

A method is described which demonstrates new facts of histological interest. First of importance is the description of the separation of the organic matrix dentin and cementum. The technic followed in this work is exacting if a clear separation of the two tissues is sought. A macroscopic and microscopic study of the structures so treated indicates that this division of the two matrices would not be possible if any interlacing fibers existed between the dentin and the cementum.

The fibers of the dentin are characteristic in that they are radial in arrangement and those of the cementum are concentric.

In addition to this dissimilarity of arrangement, there is also a slight difference in the size of the fibers. Those of the cementum are larger than those of the dentin. This difference is partly dependent upon the degree of disintegration of the specimen incident to the decalcification. If the process is carried too far, the solution of the inorganic portion of the tooth is followed by a partial disintegration of the organic part. As a result, concordant results are difficult to obtain in specimens which have not been carefully controlled.

I feel very much indebted to Miss R. Carson, Miss V. Litch and Mr. C. O. Tufts for assistance in preparing and photographing the material with which this paper is illustrated.

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STUDY NUMBER TWO

IN a previous paper (1), it has been reported that the decalcified organic matrix of the cementum and the organic matrix of the dentin may be separated in the same specimen by a definite laboratory procedure. This separation is possible on account of the fact that no interlacing fibers between the two tissues can be demonstrated. If such fibers exist, they would serve to bind these two structures together and would also provide a means of connection or communication between them. In the tissue so separated there is an observable difference not only in the arrangement of the fibers but also in their relative size.

Since these fundamental structures of the dentin and of the cementum do not appear to be united, it becomes of interest to determine whether or not a connection can be demonstrated in the specimen

which has not been decalcified. Such a condition is conceivable, and in fact has been reported by Howe (2). The results which he discusses are interesting only in that they afford a comparison of different laboratory procedures.

Two methods have thus far been used to settle this mooted question, namely, the so-called vacuum method of Marshall (3) and the ordinary method of staining, as reported by Howe. Judging from the results obtained by each of these methods, it is apparent that although the former method is not entirely free from criticism, it is to be preferred over the latter for the reason that the technic of staining the specimen is more exact and is subject to more definite control. With the immersion method, the dye penetrates both cementum and dentin. As a result, there is a greater opportunity for misinterpretation of microscopic evidence than is the case when the vacuum principle is employed. By subjecting the specimen to vacuum staining, it was shown that the penetration of the stain does not pass the dento-cemental junction.

Is it possible that these principles have some value from the practical aspect? This report describes the observations made on the extent to which solutions penetrate through the walls of the root-canal into the dentin in conditions similar to those found in clinical practice. The depth of this penetration may be conveniently measured by colored solutions.

THE LABORATORY METHOD

Various dyestuffs may be employed for the purpose above outlined, but a mixture of crystal violet and brilliant green was found to be most suitable. Berwick (4) has described the sterilizing properties of an alcoholic solution of these two dyes. It occurred to me that this reagent, on account of its intense staining qualities, might have some advantages over others and, further, that on account of its antiseptic properties it might find an application in clinical practice.

A series of specimens were prepared in which the root-canals were cleansed and prepared for filling in a manner analogous to that employed under clinical conditions. The canals were dried thoroughly and then treated with a 2 per cent. aqueous solution of the dye. The application of the dye was made by means of a cotton point introduced three or four times successively in the canal.

On the following day, the tooth was split throughout the length of the root-canal and examined microscopically. The splitting was accomplished by grinding two slits with a carborundum disk, in some cases lingually and labially, and in other cases mesially and distally. The direction of the slit followed the general direction of the long axis of the tooth, and paralleled, in many instances, the exact course of the root-canal. This was easily accomplished on account of the fact that as the disk approached the root-canal, the stained dentin



Fig. 1—Radiograph and enlargement of tooth treated by silver method. The white dots at the apex of one of the roots indicate the position of the accessory foramen and are caused by the deposited silver.

indicated the direction to be followed. Specimens were not cut through with the disk in any case, for the grinding was stopped with the first appearance of a blue color. By inserting a knife blade, or a No. 20 Black chisel, the tooth was split in the direction of the two slits which had already been cut.

Sections prepared in the manner described have the advantage over those which are ground, either by hand or by machine, in that the material resulting from the cutting is of so coarse a nature that it can be easily removed from the tooth structure. Consequently the anatomical characteristics of the tissue are not obliterated by the fine dust and detritus which results from the preparation of ground sections. It has a disadvantage, however, in that the surface to be examined is sometimes very uneven, and the proper microscopic study of such a surface requires a considerable modification of focal length in studying the field.

Photomicrographs of the material examined show that in no case did the dye penetrate beyond the dento-cemental junction. The dye

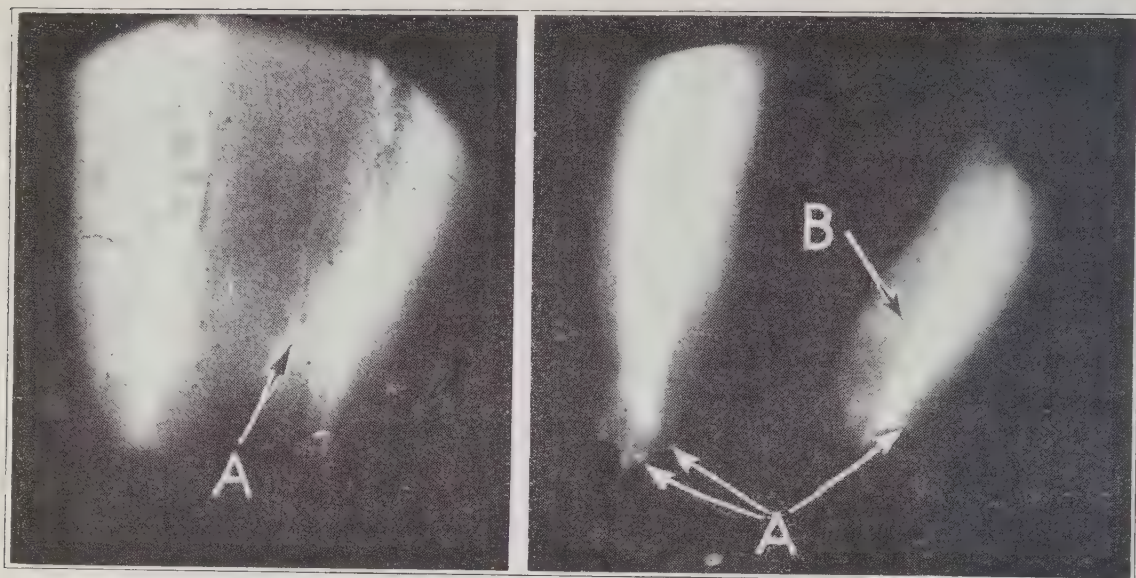


Fig. 2—Enlargement of radiograph showing penetration of colloidal silver in root-canal of molar. The outline of the root-canals is very definitely shown together with the position of accessory foramina as indicated at A and B.

follows the course of the dentinal tubules to this point but does not penetrate into the cementum. Although this connection between dentin and cementum cannot be demonstrated, some observers have



Fig. 3—Penetration of silver solution into walls of dentin.

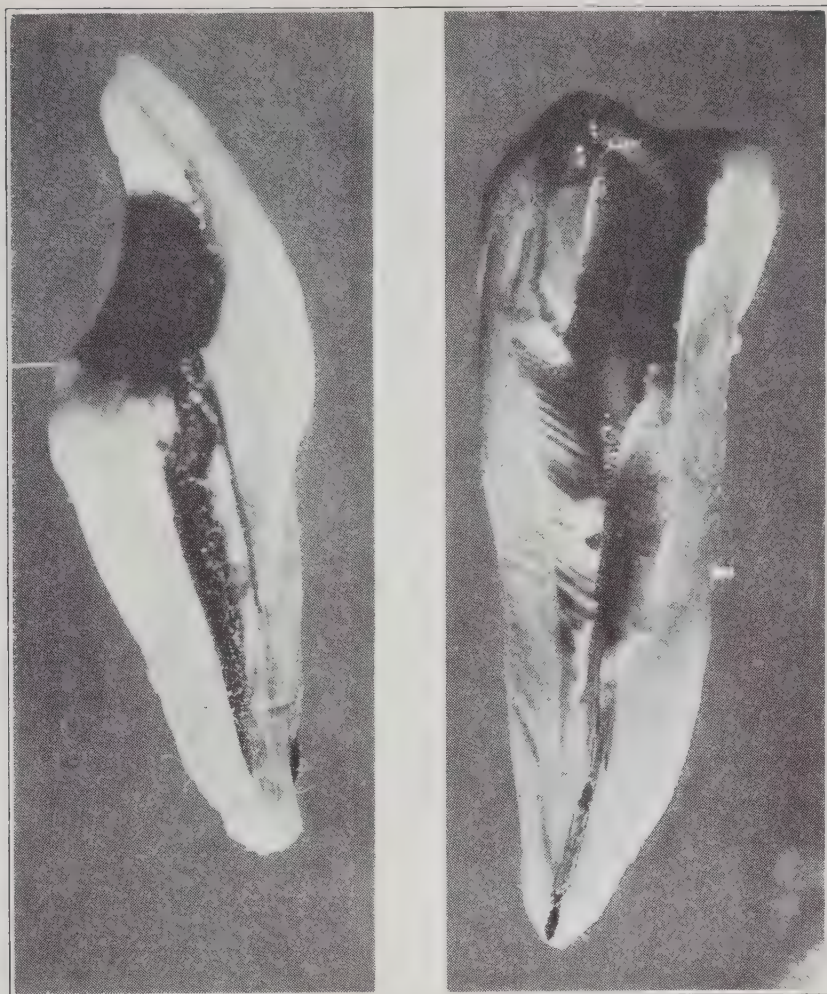


Fig. 4

Fig. 5

Figs. 4, 5—Fig. 4, incisor tooth, the crown of which was not properly insulated from action of crystal violet and brilliant green. Fig. 5, bicuspid tooth showing result of lack of insulation of the crown.

pointed out that there is, nevertheless, the possibility of fluids passing through these tissues. This, they explain, may be due to the fact that the structures are permeable and that osmosis occurs. Assuming that dentin and cementum possess properties in common with permeable membranes, this property exists only when both free surfaces are permitted to have access to fluids or gasses.

By the term "free surface" I refer, on the one hand, to the outer surface of the cementum, or that surface lying next to the peridental membrane, and, on the other hand, to that portion of the dentin which forms the walls of the root-canal. If one side of a permeable membrane be so treated that the pores of the membrane become closed, the property of permeability is lost at once. It is by means of this property of permeability that the phenomenon of osmotic pressure depends. A substance or liquid may pass through a permeable membrane under conditions which may be capable of control and of measurement, and the pressure which is exerted against the membrane by the passage of the liquid is termed "the osmotic pressure."

If dentin and cementum are permeable membranes, the first object

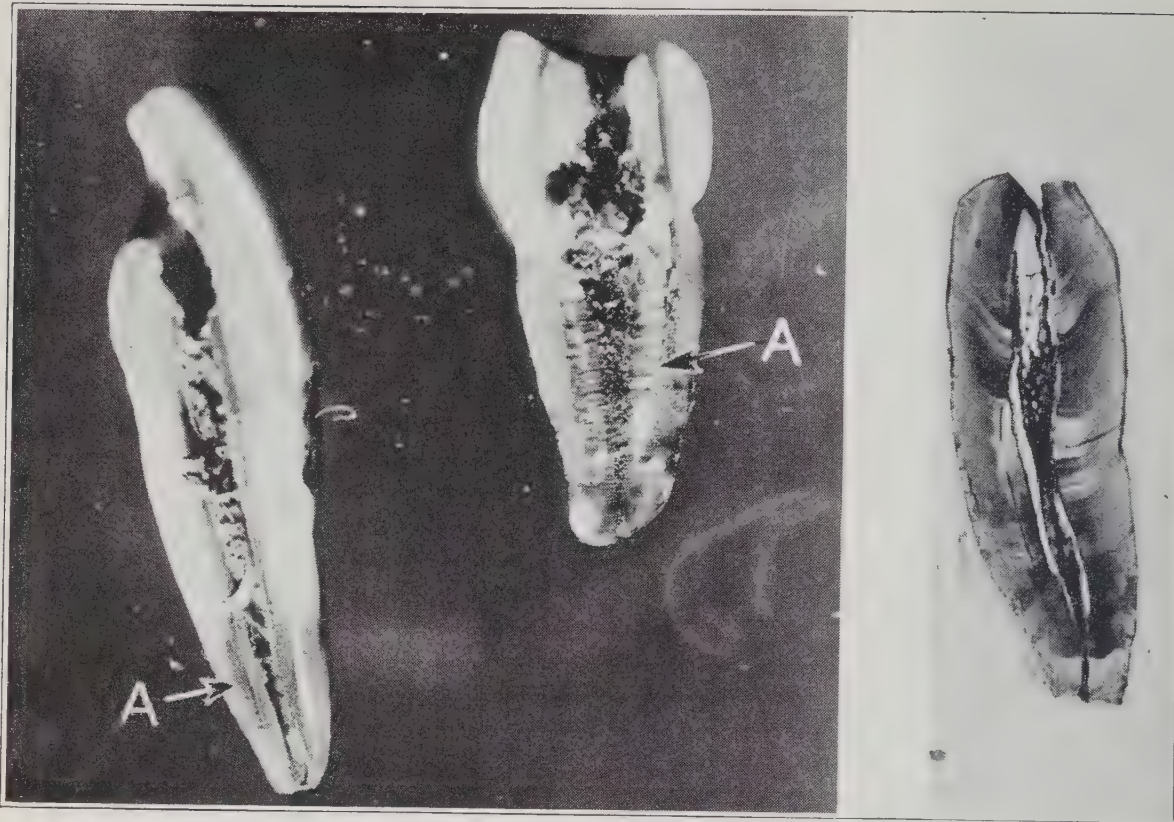


Fig. 6

Fig. 7

Figs. 6, 7—Fig. 6, crowns of specimens protected by means of varnish and wax, extent of penetration of crystal violet and brilliant green in the root portion indicated at A; Fig. 7, penetration throughout tooth of crystal violet and brilliant green.

to be accomplished in the filling of a root-canal is to treat one of the free surfaces in such a manner that this property of permeability is reduced to a minimum, if not actually lost. In addition to this, the application of antiseptic solutions, which would permeate or penetrate the dentin, would have an added value. This value would consist in the fact that when the antiseptics are once applied to the dentin, and one of the free surfaces is varnished over, these antiseptics remain in the tissue. They remain permanently for the reason, first, that there is no connection between dentin and cementum whereby the fluids can be diluted and removed; and, second, if the root-canals be treated with certain substances, as, for instance, a solution of rosin dissolved in chloroform, the property of permeability, which we consider hypothetically as present, is reduced to a very considerable degree, if not entirely lost. No opportunity occurs under such conditions for the dissipation or dilution of these antiseptics. In those cases where multiple foramina exist, the possibility of successfully occluding the numerous openings is discussed in another place. At present the greatest success is attained by the application of the silver oxid treatment. Figure 1 shows the amount of penetration which has been obtained under clinical conditions. At B there is a portion of tissue which contains a greater deposit of silver than in the surrounding region. On inspection of the specimen it was found that there was a lateral

foramen at this point which opened about one-third the distance from the apex to the bifurcation of the root. The silver had penetrated into this foramen and had deposited there, without the use of any instrumentation. In fact, instrumentation in a case of this sort is obviously impossible.

The almost universal success which the Howe treatment has attained is due to the fact that the precipitated silver may be regarded as a permanent antiseptic, and as such is capable of resisting the action of bacteria. The use of this solution, when correctly applied, permits a thorough penetration of the silver into the tubules of the dentin, and such a penetration is permanent for the reason already stated. It is possible, however, to avoid the inflammation which sometimes follows the use of Howe's treatment, by substituting for the silver salt a solution of crystal violet and brilliant green. This solution penetrates with even greater facility than does the silver salt, and has, apparently, an equal antiseptic value. The extent to which the penetration of the dye occurs is indicated in Figures 4-8. In this particular case the specimens were treated in the laboratory in a manner somewhat similar to that which would be employed in treat-

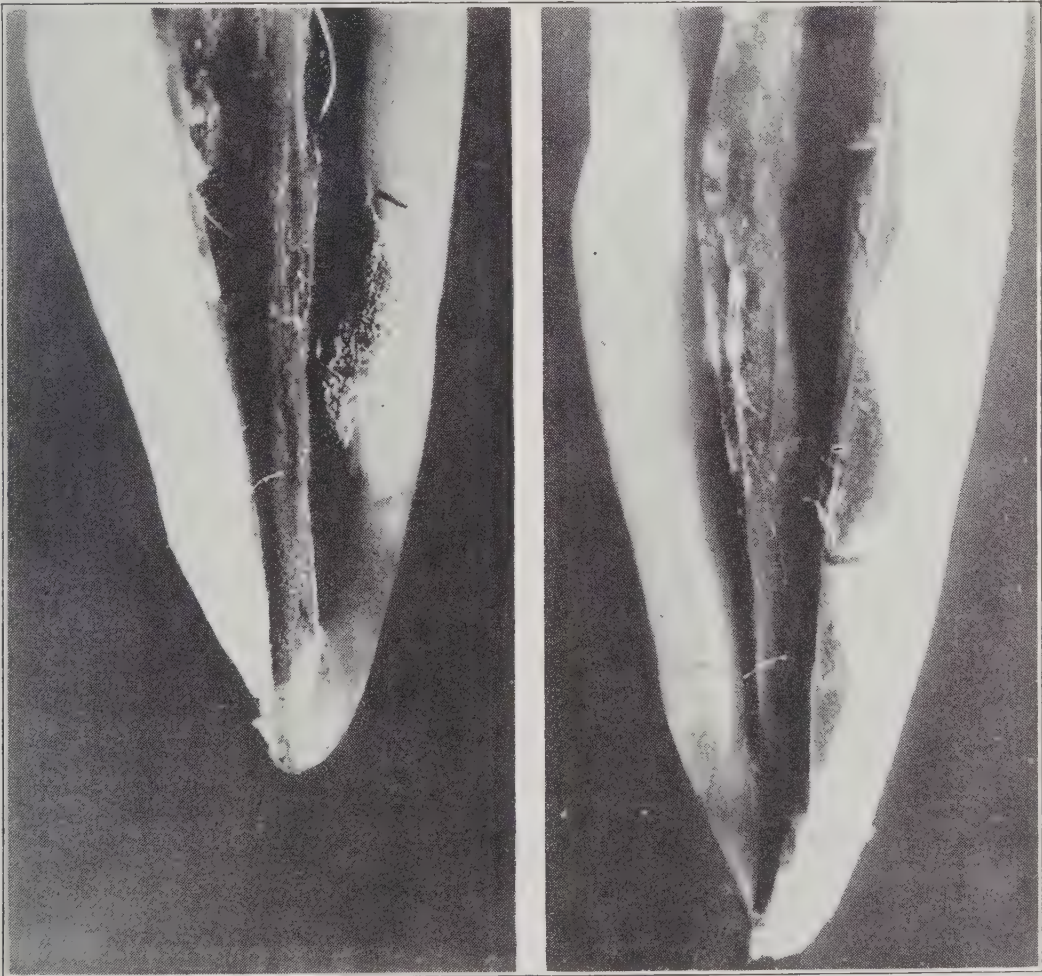


Fig. 8—Enlargement of two incisors showing degree of penetration of crystal violet and brilliant green.

ing the tooth in the clinic. Freshly extracted teeth were carefully cleansed, and the root-canals dried by means of cotton points and heated wire. Following this a solution of crystal violet and brilliant green, 1 per cent. each in 50 per cent. alcohol, was applied to the canals three or four times successively by means of a cotton point. The dye was allowed to penetrate for a few moments, and then the teeth split in a manner similar to that described in a foregoing paragraph.

The dark area surrounding the root-canals is produced by the intense color of the dye. This penetration, it will be noted, has gone as far as the dentocemental junction, but in no case has it passed through this junction.

The same remarks apply to the sections showing the staining and penetration which may be expected from the use of the silver solution as described by Dr. Howe. As a consequence of these findings, it has been possible to develop a clinical procedure for the treatment of root-canals, which has been followed in the clinic at this institution for the past year with visible success. Cases have been observed clinically and bacteriologically, and an extended report covering this phase of the research is reserved for a subsequent article.

CLINICAL PROCEDURE

In the use of crystal violet and brilliant green, it is necessary to observe the same precautions as those which are followed in the application of the silver solution. Particular note is to be made of the fact that treatment with this solution is governed by definite technic. The intense staining qualities of the dye render it objectionable when anterior teeth are to be treated. It is possible, however, to overcome this handicap if the crown of the tooth is varnished and waxed before the dye is applied. The solution should not be permitted to come into contact with any of the dentin surrounding the pulp chamber. In the case of anterior teeth, it is sometimes advisable to carry the wax down nearly into the gingival third of the root-canal. This is especially true where there has been any recession of the gum line.

The treatment, then, consists of packing the opening of the root-canal with three or four cotton points, and then varnishing the pulp chamber thoroughly, as well as other portions of the crown. Following this, melted wax should be used as an additional protection against the solution, the wax being applied by means of the hot spatula. When the wax has cooled sufficiently, the plugs which are in the root-canal are removed and the root is ready for the application of the dye.

The tooth must be so prepared that there is no difficulty in carrying a cotton point from the dappen glass to the canal itself. After two or three successive applications of the dye, five to ten minutes should

elapse to allow the material to thoroughly penetrate into the dentin surrounding the canal.

Finally, the excess of the dye is removed by dried cotton points, and the canal thoroughly desiccated by means of successive applications of alcohol or acetone and finally by a warmed wire.

The next step is to varnish the walls of the root-canal completely, using a 10 per cent. solution of rosin and chloroform, as has been outlined by Callahan and others. The careful and thorough application of this liquid is of primary importance. It is essential that the canal be dried before any of the rosin solution is applied. Otherwise, the effect sought for, namely, the varnishing of the walls of the canal, will meet with no success. Finally, the usual solution of chloro-percha is worked into the canal, and the *measured* gutta-percha point carried into place.

The shrinkage of the solution of gutta-percha is partly overcome by the rosin preparation; for the rosin appears to act as a binder to the gutta-percha. Teeth so treated have been examined by means of the radiograph, as well as by means of bacteriological tests, and while success has not attended every case, the results are promising. The reports of the bacteriological findings will be made the subject of a separate article.

CONCLUSION

1. This paper correlates the laboratory study of root-canal sterilization with clinical practice. The degree of penetration of antiseptics into dentin is illustrated by employing solutions of crystal violet and brilliant green.

2. In many cases the dye penetrated through all the dentin substance to the dento-cemental junction, but in no case was it possible to demonstrate the penetration into the cementum.

3. In comparing the action of these dyes with that of the Howe solution (silver nitrate treatment) it is shown that the degree of penetration is apparently equal. The discoloration of the tooth structure may be controlled by varnishing and waxing the coronal portion of the tooth.

4. The possibility of osmosis occurring between the tooth substance and the surrounding tissues is discussed. Since there is no demonstrable connection between the dentin and the cementum, except through the apical foramen, antiseptics properly applied to the walls of the root-canal remain in the tissue. Finally a technic is described for obtaining permanent sterilization of the dentin.

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STUDY NUMBER THREE

INTRODUCTION

THE study of the problem of sterilization of pulp canals falls into three main divisions. The first is concerned with the gross and microscopic anatomy of the dentin and cementum; the second, with methods of treatment, and the third, with an analysis of the results from a clinical and bacteriological standpoint. A contribution to the microscopic anatomy was offered in a report upon the organic matrices of dentin and cementum and in it a method was described by which it is possible to separate and differentiate the organic matrices of the structures concerned (1). This separation between the two structures, as has been previously observed, indicates that dentin matrix and cementum matrix are without demonstrable connection. Since it has been proved by others that the ground section of a calcified specimen presents no conclusive evidence of direct communication, it follows that with the exception of accessory foramina, there have been no experimental data submitted which would suggest the existence of this anatomical characteristic. These researches point, on the other hand, to the fact that the structures do not possess interlocking fibers in the organic matrices, or communicating channels in the calcified specimen. It follows, then, that antiseptics or fluids which are placed in the pulp canal for the purpose of sterilization are probably not directly subject to dilution and removal by the collateral circulation of the peridental membrane. Osmosis may tend toward such a dilution and the possibility of this action has been discussed in a previous article.

The extent of penetration of fluids in general and of certain antiseptic solutions in particular, was demonstrated in a second article (2). Included in this discussion was the description of a new application of a solution of crystal violet and brilliant green. The advantages and disadvantages which this solution possesses were compared with other antiseptics and in particular with the silver treatment as advocated by Dr. Howe.

The next part of the problem deals with the relative efficiency of the antiseptics employed and may be summarized by the question, What success may clinicians expect from the treatment of infected teeth and how may that success best be measured?

This paper reports the results obtained from bacteriological tests following the treatment of infected pulp canals. It constitutes, in fact, a preliminary survey of two problems. First, a consideration of different sterilization methods adopted in this class of dental operation, and second, a comparison of clinical and laboratory results obtained with a few selected antiseptics. The work reported is based on clinical and laboratory records of 127 cases presented at the dental clinic of the College of Dentistry, University of California.

At the beginning of the experiment, it was sought to determine whether it was possible to treat a pulp canal in the clinic in such a manner as to render it sterile. Although our present technic has been improved by the correlation and interpretation of laboratory data, the clinical findings have not been sufficiently tabulated and analyzed. It is this tabulation and analysis which is presented for your consideration. The research of Cevey reported from Zurich is confirmed, but the list of antiseptics employed by him has been considerably extended.

In seeking for a standard clinical method of procedure, it is at once apparent that the factors in the personal equation, or the habits and technic of the operator, are variable and fluctuating. Clinical procedure is never absolute. It is relative, not only from the standpoint of the operator, but also when compared with the work of others. It is not claimed that the operative details which were assigned have any particular virtue over others. They were adopted as a standard because it was necessary, when beginning experimental work, to formulate uniform procedures which will render reliable results, and which admit of clinical adoption.

After the assignment of the patient to the student a differential diagnosis of the pathological condition was made by the operator and then corrected or confirmed by the instructor. Following this, the designated treatment for the case was instituted and continued under careful supervision. At the conclusion of the treatment, the pulp canal was tested for sterility, as described later. The sterilized rubber dam was adjusted and the exposed area, both dam and teeth, washed several times with 70 per cent alcohol. The tooth under observation was then carefully opened, the dressing removed and the canals dried with sterilized cotton points.

It has been reported by Pond (3) and others that the cotton points supplied to the profession in "aseptic" (?) sealed cartons are usually contaminated. Although the contamination may be from an organism of a non-pathogenic type, it is nevertheless incorrect to assume that such a dressing is aseptic. All dressings used were sterilized in test-tubes placed in the Rochester type of steam sterilizer.

In the treatment of an individual case, a score or more of these points were shaken from a test-tube into a sterile petri dish, a procedure which obviated the necessity of inserting an instrument into the tube. For if an instrument is used to carry the points from a test-tube to the canal directly, there is always the probability of contamination of the entire stock. By placing sufficient points for the case at hand in a petri dish, this risk is reduced to a minimum. The dressing is carried from this container to the tooth with treatment pliers. These are first dipped in alcohol and then flamed before picking up the cotton point. The cover of the petri dish should not be removed entirely,

but should be raised just enough to permit access to the sterilized canal dressing in the dish. In preparing the pulp canal for the bacteriological test, it was first carefully dried, a fresh *dry* sterile point inserted in the cavity, and the tooth sealed in the following manner.

A small pellet of sterilized cotton was forced with pressure into the opening of the canal. Following this the apical portion of the pulp chamber was sealed with baseplate gutta-percha. The cavity was moistened with a little chloro-percha, and warm baseplate gutta-percha sealed into the apical half of the pulp chamber. The remainder of the cavity is filled with Ames' crown and bridge cement. It has been found that by following this procedure, more uniform results are obtained, for even the lower central incisors, teeth with small pulp chambers, may be handled in this manner. The following day the tooth was again opened under the sterile conditions described above, and the cotton removed from the canal. A series of culture tubes, containing glucose blood broth were placed at the operator's left and the cotton point carried immediately from the pulp canal to the tube. The canal was again inspected for moisture and the second point inserted for a few moments. Usually two tests of each canal were conducted but in some cases this was not feasible.

The tube containing the point was incubated and the specimen examined microscopically, in accordance with the usual bacteriological technic. In cases where organisms were found, the material was transplanted to blood agar plates and the cultural characteristics determined.

The tables indicate the results of this experiment. They summarize the pathological condition, and the method of treating the individual cases. Frequently it was necessary to repeat the treatment and this repetition has been indicated by a numerical reference. In some instances it will be noted that the infected canal, even though the treatment was repeated, could not be rendered sterile. The canal, however, was perfectly dry and showed no clinical sign of infection. These canals were filled in spite of the fact that it was impossible with our technic, at least, to secure a sterile test. On two occasions this practice was followed by the development of an acute apical abscess.

The administration of a large clinic is different from that of a private practice, for the reason that the patients cannot obtain the same professional attention accorded under less public conditions. Appointments are frequently cancelled and valuable time lost. It has been necessary, therefore, on some occasions to use more than one antiseptic in a canal. For example, in Case 22, Table I, a putrescent pulp was treated successively with formo-cresol, dichloramine-T, and crystal violet and brilliant green. The reasons neces-

TABLE I.

PULP CANALS STERILE AFTER FIRST SERIES OF TREATMENT.

NO.	CLINICAL RECORD.	THERAPY	RESULT
93	Putrescent pulp	Beechwood creosote	Canals filled
94	Pulp exposed and extirpated by pressure anesthesia	Phenol	" "
96	Dry gangrene	Dichloramine-T	" "
105	Pulp exposure	"	" "
30	"	"	" "
83	Putrescent pulp	Formo-cresol	" "
88	Partly putrescent pulp	Dichloramine-T	Extracted
89	"	"	"
90	"	"	"
95	Pulp exposed	Beechwood creosote	Canals filled
28	Putrescent pulp	Dichloramine-T	" "
47	Acute apical abscess	"	" "
11	No record	"	" "
12	"	"	" "
15	Acute apical abscess	"	" "
18	Chronic apical abscess	"	" "
19	"	"	" "
20	"	"	" "
67	"	"	" "
68	"	"	" "
45	"	"	" "
56	"	"	" "
57	"	"	" "
58	"	"	" "
82	Acute apical abscess	Dichloramine-T	Canals filled
84	Chronic apical abscess	Beechwood creosote	" "
85	"	"	" "
101	"	Dichloramine-T Beechwood creosote Dichloramine-T Formo-cresol	Formo-cresol dressing in canal. No filling
102	"	Beechwood creosote Dichloramine-T Formo-cresol	Canals filled
106	"	Crystal violet and brilliant green	" "
107	"	Crystal violet and brilliant green	" "
108	"	Crystal violet and brilliant green	" "
120	"	Beechwood creosote	" "
125	Unfilled canal Mumifying paste	Dichloramine-T	" "
126	Unfilled canal	"	" "
121	Putrescent pulp	"	" "
123	"	Beechwood creosote Dichloramine-T	" "
124	Pulpitis	Dichloramine-T	" "
128	Exposed pulp	"	" "
129	Putrescent pulp	"	" "
64	"	Beechwood creosote	" "
62	Extirpated pulp	"	" "
46	Devitalized pulp As ₂ O ₃ fiber	Dichloramine-T Beechwood creosote Dichloramine-T	" "
41	Extirpated pulp	Beechwood creosote	" "
137	Pulp exposure	Eugenol Dichloramine-T	" "
42	Putrescent pulp	Beechwood creosote	" "
138	Chronic apical abscess	Dichloramine-T	" "
139	Dry gangrene of pulp	Beechwood creosote Dichloramine-T	" "
55	Exposed pulp devitalized by As ₂ O ₃ fiber	"	" "
32	Putrescent pulp	"	" "

sitating this procedure were those over which the college had no control. In studying these tables it must be borne in mind that the efficiency of dichloramine-T continues only while chlorine is being liberated from the compound. This antiseptic was applied four separate times twenty-four hours apart (4). If the dichloramine-T remained longer than twenty-four hours, the procedure was repeated. There were other instances in which the treatment was recommenced on account of faulty technic of the student. His operative skill is never as highly developed as that of an experienced operator; his method of handling instruments and of handling clinic materials is sometimes clumsy. But on the other hand, it is probable that his training in bacteriological technic is better than that of the average dentist. It is apparent, therefore, that there was a greater necessity for the re-treatment of canals than would be necessary in private practice with an experienced operator.

In Table I are grouped those cases which after the first series of treatments were found sterile by laboratory test. The clinical record includes acute and chronic apical abscess as well as putrescent and gangrenous pulp conditions.

Experiments 88, 89, and 90, deserve comment. In this particular case, a partly putrescent pulp was causing severe pain and a mandibular injection for removal of the residual hypersensitive pulp filaments was unsuccessful. After a series of treatments with dichloramine-T followed by eugenol, the inflammation subsided to such an extent that devitalizing fiber was applied. Subsequently the remaining pulp stumps were removed and the canals prepared for filling. A radiograph taken at this time showed that one of the canals had not been opened entirely to the apex. Further attempts at reaming the canal were unsuccessful. A second radiograph taken with the diagnostic wires in place was misinterpreted and a diagnosis of a perforated root was made. On extraction of the tooth the roots were carefully examined but no perforation could be found.

Table II summarizes the pathology, treatment, and the result of cases similar to those in Table I.

Since none of these proved sterile after the first test, the therapy was repeated. A numerical reference in the third column has been given which furnishes an index to the subsequent data found in Tables III. and IV.

Although the majority of cases cleared up satisfactorily after this renewed attempt at sterilization, there were some of these which apparently remained infected. These are summarized in Table IV.

With the permission of the patient the canals were filled and the patient instructed to return for observation and for further radio-

TABLE II.

PULP CANALS INFECTED AFTER FIRST SERIES OF TREATMENTS.

NO. CLINICAL RECORD.	THERAPY.	RESULT.
70 Acute apical abscess	Dichloramine-T	Treatment repeated, 98
71 " " "	"	" " 99
72 " " "	"	" " 100
34 Dry gangrene	Beechwood creosote	" " 34a
73 Chronic apical abscess	Crystal violet and brilliant green	" " 73a
74 Putrescent pulp	Crystal violet and brilliant green	" " 74a
40 Infected pulp	Eugenol	" " 40a
54 " "	Beechwood creosote Crystal violet and brilliant green	" " 54a
43 " "	Dichloramine-T	" " 44
22 Putrescent pulp	Formo-creosol Dichloramine-T Crystal violet and brilliant green	" " 29 and 29x
21 Chronic apical abscess	Dichloramine-T Beechwood creosote	" " 23
13 Putrescent pulp acute pericementitis	Dichloramine-T Beechwood creosote 11/17/20.-1/20/21 Dichloramine-T 1/20/21.-1/24/21	" " 13a
14 Putrescent pulp acute pericementitis	Dichloramine-T Beechwood creosote Dichloramine-T	" " 14a
80 Putrescent pulp	"	" " 80a
97 Pulp exposure	"	" " 97a
86 Putrescent pulp	" Beechwood creosote Formo-cresol	" " 86a
103 Pulp exposed	Dichloramine-T	" " 103a
104 " "	"	" " 104a
38 Acute apical abscess	Dichloramine-T	Patient did not return for further treatment
127 Unfilled canal	Dichloramine-T	Treatment repeated, 127a
1 No record	Beechwood creosote	" " 1a
2 " "	"	" " 2a
3 " "	"	" " 3a
17 " "	Dichloramine-T	" " 17a
66 " "	"	" " 69
49 " "	Beechwood creosote	" " 65
65 " "	"	" " 81
76 " "	"	" " 87
75 " "	Dichloramine-T	" " 91
111 " "	"	" " "
112 " "	"	" " "
113 " "	"	" " "
114 " "	Beechwood creosote	" " "
115 " "	"	" " "

TABLE III.

PULP CANALS STERILE AFTER SECOND SERIES OF TREATMENTS.

NO. CLINICAL RECORD.	THERAPY.	RESULT.
80a Repetition of 80	Crystal violet and brilliant green	Canals filled
97a " " 97	Dichloramine-T Crystal violet and brilliant green	" "
86a " " 86	Dichloramine-T	" "
103a " " 103	" Crystal violet and brilliant green	" "
104a " " 104	Dichloramine-T Crystal violet and brilliant green	" "

NO. CLINICAL RECORD.			THERAPY.	RESULT
127a	Repetition of	127	Dichloramine-T	Canals filled
98	"	"	"	"
99	"	"	"	"
100	"	"	"	"
34a	"	"	"	"
73a	"	"	Crystal violet and brilliant green	"
74a	"	"	Crystal violet and brilliant green	"
40a	"	"	Dichloramine-T	"
44	"	"	"	"
29	"	"	"	"
29 x	Cheek test of	29	"	"
23	Repetition of	21	"	"
			Crystal violet and brilliant green	"
13a	"	"	Dichloramine-T	"
14a	"	"	"	"
17a	"	"	"	"
69	"	"	"	"
81	Repetition of	49	Dichloramine-T	Canals filled
81a	"	"	"	"
87	"	"	Beechwood creosote	"
91	"	"	Dichloramine-T	"
114a	"	"	"	"
115a	"	"	"	"
1a	"	"	"	"
2a	"	"	"	"
3a	"	"	"	"

TABLE IV.

PULP CANALS FROM WHICH NO STERILE TEST COULD BE OBTAINED.

NO. CLINICAL RECORD.			THERAPY.	RESULT.
51	Imperfect canal filling		Dichloramine-T	Canals filled
52	"	"	"	"
53	"	"	"	"
59	"	"	"	"
48	Putrescent pulp		"	"
54a	Repetition of	54	Beechwood creosote	Treatment repeated
			Crystal violet and brilliant green	
61	"	"	Dichloramine-T	Canals filled
				Acute apical abscess developed.
33	Putrescent pulp		"	Canals filled
			Beechwood creosote	
35	Chronic apical abscess		Dichloramine-T	Tooth extracted
36	"	"	"	"
37	"	"	Formo-cresol	"

TABLE V.

INFECTED PULP CANALS.

INCOMPLETE CLINICAL AND LABORATORY RECORDS.

NO. CLINICAL RECORD.		THERAPY.	RESULT.
38	Acute apical abscess	Dichloramine-T	Patient did not return for root-canal filling.
39	Canals previously filled with iodoform paste. No clinical symptoms.	"	"

graphic diagnosis. In those instances where it was found inadvisable to fill the canal, the tooth was extracted.

It is realized, of course, that this is only a step taken toward the study of root-canal sterilization. One of the points yet to be considered is this. After a sterilized root canal has been filled properly, what condition may we expect to find at the end of six months or a

year when we remove the root-canal filling? Will the area remain sterile during this interval of time or will organisms from other localities have found favorable opportunity in this region for growth? Is tissue resistance lowered in the periapical region, and if so, what is the effect of this lack of tone? Theoretically the canals should be sterile and the experimental work was designated to prove or disprove this point. Clinically, however, we are still in the dark. We do not know the final result. Our lack of authentic data on this phase of the problem emphasizes the necessity of maintaining case records which show both treatments and clinical conditions at regular intervals. Whenever it becomes necessary to institute therapeutic measures, appropriate notations should be carefully recorded and checked from time to time.

In all there have been 127 cases reported. Of this number 10 per cent. (Tables IV and V) remained infected after repeated treatments; 39.4 per cent. were sterilized successfully the first time; 26.8 per cent. were infected after the first series of treatments, and 23.6 per cent. were found sterile after the repetition of the clinical procedure.

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The Dental Hygiene Programme of Canada*

BY WALLACE SECCOMBE, D.D.S., F.A.C.D., TORONTO, ONTARIO.

AT the last meeting of the Canadian Dental Association the following programme was adopted as a suitable basis upon which the dental profession might organize its oral hygiene work throughout the Dominion of Canada:

(1) Support the inauguration of systematic inspection and regular treatment of the teeth of the school children of Canada, to be undertaken at the general expense of the municipality.

(2) Urge the establishment of a Dental Service in every hospital, and lectures to nurses in training.

(3) The establishment of adequate courses of instruction to normal school students and teachers in training.

(4) Publication of charts and diagrams for use of teacher, nurse, and dentist, in school work.

(5) Issue booklets for information of parents, teachers, and the public generally.

*Read before the American Dental Association, Cleveland, Ohio, September 10-14, 1923 and published in November *Journal N.D.A.*

(6) Preparation of lantern slides and lecture outlines for popular public lectures on the subject of the teeth and their care.

(7) Stand ready to make representations before public bodies, either by letter or otherwise, in support of above objects.

In carrying out this programme, the following work has been accomplished during the past year:

School dentists have been appointed throughout Canada, most large cities having one or two school dental officers, many having four, five or six, while Toronto, with a population of 541,000, has 33 dental officers.

These services naturally lead to the appointment of a provincial or state officer to correlate the work. The Province of Ontario has already passed an Order in Council providing for the appointment of a Director of Dental Services. This officer will be attached to the Department of Health and will have charge of the dental needs of inmates of public institutions, besides assisting in the organization of new services by local municipalities.

The adoption of a text book on Oral Hygiene is being urged upon the Department of Education by the Manitoba Committee.

Lectures have been given to Community Leagues, Mothers' Meetings, Luncheon Clubs, Home and School Associations and other bodies.

Throughout Canada efforts have been made to secure the appointment of local dentists to give courses of from five to ten lectures to nurses in hospital training. In Ontario an outline of suitable lectures was prepared and a printed copy distributed to each lecturer, that a more uniform course might be given. Lectures to nurses also included periodic lectures to graduate nurses connected with departments of health and education.

The hospital being the public health center for the community, dental services have been organized in many Canadian hospitals. These services have been established upon the same basis as the other out-patient services and with equal status. In such cases a new standard of mouth health has been established for in-patients, as well.

Lectures to school teachers in training in normal schools have been found of great importance. Also talks to school teachers meeting in annual convention, showing how Oral Hygiene work may be correlated with the regular school curriculum.

Preschool-age dental clinics are carried on in connection with both Health Centers and School Clinics where results show that where in the past children entered school with 75 per cent. unhealthy mouths, now enter school 90 per cent. dentally healthy.

Charts and lantern slides have been freely used. Charts printed upon cotton have proven of value in schoolroom talks or lec-

tures to small groups where lantern is not available. For larger meetings lantern slides are of special value. A catalogue of lantern slides is being prepared and arrangements made for local lantern slide dealers to keep the same in stock and rent them for a nominal sum. This, of course, means a standardization throughout the country. One of the Provinces has purchased two lanterns with slides, and these are sent out to local centers by the Oral Hygiene Committee as required.

Booklets of information have been prepared both for the dentist and the layman. The booklet for the dentist contains detailed information suitable for public addresses and including instructions regarding the organization and administration of dental services in hospitals, industrial plants and for school children.

The booklet of information for public distribution contains information regarding diet and mouth cleanliness.

Last year Ontario dentists spent \$2,000 in buying space in the more important daily papers throughout the Province, for the publication of a series of bulletins on Oral Hygiene.

At the conclusion of the war, the Red Cross had on hand large sums of money which are being spent in the organization of Junior Red Cross units and in health education. In several of the Canadian Provinces the Oral Hygiene Committees are co-operating with the Red Cross in the establishment of dental clinics and in sending out dentists with portable outfits to work in rural and outlying districts. This effort has also taken the form of motor cars, fitted up as rural health caravans in Nova Scotia.

Broadcasting short talks and instructions regarding proper care of teeth, by radio, has also proven helpful in certain areas.

Moving picture films have been used extensively in many of the Provinces.

The Oral Hygiene Committee of the Ontario Dental Association has made a special effort to provide toothbrushes and dentifrice at a nominal price to school children whose parents cannot afford to buy these toilet requisites in the ordinary way. The committee set down in detail the specifications of suitable brush and dentifrice without naming any particular make. It would be unthinkable for the profession to recommend any particular brush or dentifrice or to receive profit from the sale of these. The profession must retain its position of independent censorship, so that as these articles come upon the market, they may be criticized or praised without having the motives of the profession questioned.

J. G. Hildebrand, of Waterloo, has urged upon many occasions the desirability and absolute necessity of standardization of methods and the establishment by the profession of a central office that would function as a clearing house for the exchange of ideas and

the supplying of suitable literature and other educational material.

It is to be hoped that the present conference may result in such an organization that valuable effort may be conserved and the work carried on with greater efficiency and more telling effects.

The Public Responsibility of the Dentist

TOWARDS the public one of the chief responsibilities of the dentist is education; for ignorance and carelessness are the basis of most of the diseases common to the mouth, particularly caries. It is a common fault that the dentist is not consulted until abnormal conditions are developed and pain and discomfort force one to seek help. In this way caries flourishes in mouths to a degree well known to all of us. We realize that the more care and attention given to the teeth the less amount of caries develops. A certain amount of information relative to this proper care and attention is passed on daily to the people in the routine of practice, but the masses who need this information most, the great majority of whom perhaps never consult a dentist except when suffering from pain, cannot receive it unless there is some organized propaganda. It should be the duty of dentists wherever possible to acquaint the public with the necessity for oral hygiene, and with the methods by which this is best maintained. If the majority of the people understood the necessity for keeping the oral cavity in proper condition and the benefits to their oral and general health by so doing, a great deal of the harm which is now resulting from the lack of care could be obviated. Opportunities should never be lost of giving this information freely so long as it can be done ethically. Talks before clubs and social organizations, school children and any collection of persons interested in the betterment of the community, are of inestimable value. If we can do no more than teach the parents that it is incumbent upon them to see that the teeth of their children are properly looked after, the coming generations will be spared much of the annoyance and many of the diseases which are now so prevalent.—VIRGIL LOEB, A.B., M.D., D.D.S. (*Journal of the American Dental Association*, June, 1923).

TO PREVENT CHECKING.—Grind the facing to suit case and apply backing, bending pins to hold it in place, and before burnishing the backing snugly to facing, slip one thickness of tissue paper between facing and gold at the tip of tooth, then burnish snugly to place; the heat of soldering will burn out the paper leaving some slight space and also the ash of the tissue paper, which may also help in protecting the facing from the contracting stresses of the gold solder.—*Dental Digest*.



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121 Bishop St., Montreal, Que.

ONTARIO.

KINGSTON DENTAL ASSOCIATION.

THE Kingston Dental Association has been re-organized to fill a long-felt need. The officers elected are as follows:—

Hon. President Dr. R. E. Sparks.

President Dr. A. W. Winnett.

Vice-Pres. Dr. E. B. Sparks.

Secretary Dr. H. A. Stewart.

Treasurer Dr. W. O. Vrooman.

Drs. S. H. Simpson, C. C. Nash, and J. L. Walsh in addition to the above form the executive committee.

This promises to be the best get-together movement ever attempted amongst the Kingston dentists.

Drs. W. E. Cummer and H. S. Thomson have delivered most pleasing and instructive addresses since our first meeting in September. We hope to have more such lectures and addresses in the near future.

H. A. STEWART,

Secretary

QUEBEC

MONTREAL DENTAL CLUB

AT the last meeting of the Montreal Dental Club, "Oral Health" was appointed official organ of the Club.

The officers for 1923-1924 are:—President, Dr. F. G. Henry; Vice-President, Dr. J. S. Common; Secretary-Treasurer, Dr. A. N. Jenks.

Committee:—Drs. H. V. Driver, F. H. A. Baxter, Ross Cleveland, D. P. Mowry, R. W. Edmison.

On Wednesday evening, October 17th, F. A. C. Scrimger, V.C., M.D., gave a very earnest lecture on "Common Tumors of the Mouth

and Face." He pointed out the dentist's special responsibility in early recognition of cancer.

On November 22nd and 23rd, Dr. Felix A. French of Ottawa, gave a complete clinic on modern full denture construction, including compound impression taking, bite taking, selection of teeth, set up, finish and grinding in.

A dinner was given in honor of Dr. French on Thursday evening, November 22nd, at the Windsor hotel.

A feature of the dinner was the menu, which consisted of a balanced ration suggested by the Defensive Diet League of America.

In his after-dinner address, Dr. French spoke on "Art and Aesthetics and Occlusion and Articulation." He explained the principle and use of the Hanau Articulator.

Dr. Charles Morison moved a vote of thanks to the Clinician for his exceedingly able Clinic and Lecture. This was seconded by Dr. R. W. Edmison, and approved by the large meeting.

The sum of twenty-five dollars (\$25) was voted to the Research Committee of the Canadian Dental Association, and Oral Health was appointed official organ of the Montreal Dental Club.

At the December meeting, Dr. Dohan will give a talk on his lengthy European tour, followed by a round-table discussion of dental topics.

In January, Dr. Kurt Thoma, of Harvard University, and Dr. Paul Stillman, New York City, will give clinics before the Club, and in February Dr. Harry B. Johnston and Dr. Thomas Hinman, of Atlanta, Ga., will be the clinicians.

A. N. J.

Obituary

DR. C. HAROLD COWAN, son of Dr. W. D. Cowan, Regina, died suddenly in Kamloops, B.C., a few weeks ago of heart trouble. The late Dr. Cowan was 30 years of age and served overseas with the Canadian Army Dental Corps. Following the war he removed to Kamloops and has resided and practised dentistry in that place ever since. He is survived by his father, Dr. W. D. Cowan, Secretary of the Dominion Dental Council, who was formerly member of parliament for Regina, and by his mother and sister.

The sincere sympathy of the entire dental profession is extended to Dr. Cowan and his family in their bereavement.



Opportunity

WE sometimes hear lamentable tales that there are not the same opportunities for young men and women that there formerly were. Don't you believe it. There never was a time in the history of the world when there were so many opportunities as there are to-day—never any time to approach it. They literally stick out on all sides begging to be accepted. When you hear a young man say that he has no chance to get along, you may know there is something wrong with him. There are all kinds of chances.

Of course there are also stipulations. The exactions of modern life are more pronounced than ever before, and they must be reckoned with. A man cannot rise to distinction to-day by mediocre ability or indifferent application. He must key himself up to the requirements in order to succeed—he cannot blunder on to success. Neither can the most brilliant young man achieve permanent success without application. In fact, constant painstaking effort counts for much more than mere brilliancy.

Conditions have changed in the last decade, and there is an entirely different order of things in our social and economic fabric. Time was when the young man considered it a great favor to get a situation of any kind—to get the smallest sort of a start. He often worked for almost nothing to begin with—anything to get that coveted job. It was not so much the present the boy was thinking of as it was the future—the prospect of some day getting a more suitable situation and a better salary. He was willing “to labor and to wait.” Now this is all changed. To-day the boy wants to start in just where the mature man leaves off—he wants to begin at the top.

It cannot be done—all human experience is against it. Occasionally we find an old head on young shoulders, but it is the exception. Usually if a set of unique circumstances place the boy at the top, it is not long before he takes a tumble. And then he blames fate or his employer—it is never his own fault. There needs to be a revision in the point of view of the average young man of to-day—

more application and less presumption, more devotion to duty and less watching the clock. There is nothing more pernicious in the business world than that habit of watching the clock—nothing more demoralizing. It is accountable for the failure of countless numbers of men and women.

Years ago in Chicago a boy got a job in a big publishing house. He was always at the office a little before the opening hour. He went quietly about his work as soon as he arrived, and he gradually came earlier and earlier. He invariably found something to do—a boy always can if he looks for it. One morning his employer arrived at the office much before his usual hour. He found the boy busy at something, and asked him if he was in the habit of getting down that early. The boy said, "Usually, sir," and went on with his work. "But," said the employer, "this is before our office hours, and the regular work of the day has not begun. What do you find to do?" "There is always something to do," remarked the boy, and that was the end of the conversation. But the boy soon got a promotion, and then he got another, and another, and one day he was made a member of the firm, and finally branched out in a business of his own, and made an immense success of it. It is the old, old story, so often told. And yet, why is it that more boys cannot learn it?

There are numberless jobs of that very character going begging to-day—more of them than ever before—and the rewards are greater and greater. If you do not believe this, just go out and try to hire the manager of any of our big concerns.

The other day I knew of a manager of a store who was hired by another store at a salary of \$100,000 a year, and a percentage. I chance to know this man, and he is a quiet, modest, painstaking plodder. He is worth the money or he would not be paid that amount. He was hired by level-headed business men. He is not an old man, and yet that job did not come to him without experience on his part. Such jobs do not rain down from heaven—they come only after years of plodding, painstaking effort. The first remark that will be made by the reader is that jobs of that kind do not come along every day. Of course not, but there are more jobs like that than ever before, and the significant thing is that there are really not enough men of the right stamp to fill all the big jobs that are waiting for them.

In the professions there is occasional complaint of overcrowding. This may seem true for a brief period under certain conditions, but there is no real overcrowding. There are more opportunities in dentistry to-day than ever before—a wider demand for dental service. More men are succeeding in dentistry, and more men will succeed, the only stipulation being that they are the right kind of men,

and employ the right methods. Many men have gone off at a tangent and failed, and many will in the future. The one supreme essential to success in this as in every other pursuit is to follow the fundamental virtues. The farther we get away from them the more certain will be our failure, the closer we cling to them the more assuredly will we succeed. This is the lesson for every young man, and if he learns it he will not suffer from lack of opportunities.

C. H. Johnson

Circulars on "Care of the Teeth"

ANY dentist wishing to secure circulars on "Care of the Teeth" for free distribution to his patients or to school children, when making a school survey, can get a supply of an excellent bulletin, entitled "Teeth and Health," by writing to Dr. Ruggles George, Canadian Red Cross, 410 Sherbourne Street, Toronto, and stating the number required.

Bluenose Blood

FROM where Old Fundy's turgid tide roars, boiling, up the Bay
To where Cape North keeps sentinel o'er the Atlantic, grey,
There is a breed of sailormen known to the Seven Seas
And Neptune is the ruling lord of their wide destinies.
The North Atlantic is no place for pleasure's flannelled guests,
Thick fogs and threat'ning, sullen clouds lower o'er its heaving crests
That hold the menace of the berg and stress of grinding ice.
'Twas here the Bluenose waged a war that knew no armistice,
'Twas here the Bluenose learned his trade in fog and freezing sleet;
Small wonder that he deemed the rest as dross beneath his feet.

There is no sea that has not seen his bulging canvas spread,
There is no sea where do not sleep some of his hallowed dead;
From Baffin's Bay down to the Horn, from Frisco to Brisbane,
He goes and comes in his day's work and some come not again.
In the dread port of missing ships there lies a ghostly fleet,
Sent there by fog or hurricane, by berg or driving sleet.
Perchance, thin phantoms pace the decks and glory in their past,
For what is Death to Bluenose Blood that it should stand aghast?
Stark Death must come to all alike, small matter where or when,
So that they see their duty through and dying, die like men.

MARK G. McELHINNEY, D.D.S.

Ottawa,
First of January, 1924.

ORAL HEALTH

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No. 1

EDITORIAL

Fourteen Years Old—This Issue

ORAL HEALTH is now well into its 'teens, having been born just fourteen years ago. It has grown into husky young manhood in a natural, normal way. Though it has frequently suffered from "growing pains," and a few other kinds as well, it is enjoying good health, thank you, and never more optimistic for the future of Dentistry, as an integral part of the greater Public Health Service, than at the threshold of the New Year of 1924.

"Salesmanship" in the Practice of a Profession

IN recent years much has been written and publicly spoken about the value or need of more efficient and aggressive "salesmanship" within the ranks of the dental profession; that it was in the best interests of the public as well as to the financial profit of the dentist that "salesmanship" should be more scientifically studied and practised by the profession. To this end much space in our dental journals and on Convention programmes has been devoted to placing the matter before the dental profession. In many of these well-written articles the talents of the artist have been made use of, and

we have portrayed the dentist standing in front of his patient "selling" a certain restoration to the undecided and sometimes unwilling patient.

This persistent campaign about the need of the dentist developing and practising greater efficiency as a "salesman" is a matter deserving of most serious consideration.

Is it essential to successful practice, or in the best interests of the dental profession and the public, that practitioners should be expert salesmen? We decidedly think not.

The dentist who is bending his energies day after day to inducing his patients to "buy" a denture or bridge is gradually losing ground as a professional man and becoming nothing more than an ordinary business salesman. Nor does it necessarily follow that the patient is being better served. In fact, there is always the real danger of the dentist carrying his "selling" propensities too far, and thus selling too much, while serving too little.

The dentist's main object in these personal talks should be to instruct and educate the patient on such matters, for example, as to the importance and value of a complete and efficient masticatory apparatus; that proper nourishment and good health depend so largely on the thorough mastication of the food, and that food cannot be properly masticated without a full set of healthy teeth in proper occlusion.

To put it another way, such talks should always take the form of health talks, having as the main object, the education of the patient. Further, it is the duty of the dentist to place frankly before the patient the deficiency, if any, in his masticatory outfit, and what is needed in the way of restoration, etc., in order that he may be able to properly masticate his food.

In all this the ethical and conscientious practitioner will ever keep first in his thought the welfare of the patient, and the matter of *personal gain* should occupy a secondary place.

By so educating and instructing his patient, the dentist will have done his full duty, and the patient will, no doubt, be impressed with the fact that the dentist is endeavoring to render his best service and not merely to "sell" something that will bring him more gain. Once the dentist establishes such a worthy reputation, the matter of fees will take care of itself.

The expert salesman, in the garb of a dentist, may succeed in persuading the patient to agree to the more expensive restoration; but, if, on more mature consideration, the patient feels he has been the victim of over-persuasion, his confidence in his dental adviser will be somewhat shaken. The dentist may have gained financially, but it may be at the cost of his professional standing.

"Professional Salesmanship" are two contradictory terms and do

not appear well in company. Professional *advice, education and information* are what the public require and expect from the professional man. Let him prove himself efficient in these essentials and he will have done his full duty to his patient, and have run no risk of commercializing his profession.

R. G. McL.

True Professional Spirit

THE time has come when we should turn the tide of our consideration more in the direction of unselfish professionalism, and not worry so much over the money we are to make.

To make money, the chief aim is to demoralize us individually and collectively, and to stultify our professional manhood.

Better far to be considered quixotic and professionally punctilious, than to sell our ethical birthright for a mess of commercial pottage.

C. N. JOHNSON.

The American Society of Orthodontists

THE twenty-third annual meeting of the American Society of Orthodontists will be held at the Hotel Muehlebach, Kansas City, Missouri, on March 18th, 19th, 20th and 21st.

WALTER H. ELLIS,
Sec.-Treas.

Happy New Year

January First has come,—
Happy New Year, every one!
Start the year by being glad,
Let no toothache make you sad.
Clean your teeth three times a day,
Keep all germs and dirt away,—
Mouth and teeth all sweet and pure,
Happy Year you'll have, I'm sure.

—Contributed to ORAL HEALTH by
Dora L. Cameron

REMOVAL OF AMALCAM FILLINGS.—Hold a heated instrument on the filling until the heat is felt in the tooth. Burn out at once, when it can be cut like cheese. Use an instrument having a very slender shank with a bulbous end. The slender shank prevents the heat from radiating too rapidly.

A Thought for 1924

ONE of the great discoveries of recent time has been the radio. By it far places are brought near, important news transmitted quickly, and entertainment and instruction furnished us while we quietly sit at home. All we have to do is "tune in" on those things which appeal to us, and "tune out" all other sounds. It is for us to select and receive only that which we wish.

The mind is like a delicately-tuned "radio." It is constantly receiving impressions, both good and bad. By a process of elimination here too we can "tune out" all discordant thoughts and impressions and catch and seek to retain those which will definitely be of benefit.

All about us are men and women, happy and successful. Strive to catch impressions from them, and model your life on "success" lines. This year "tune in" on the thoughts of achievement and strive for happiness as one of your goals.—Selected.



SIDNEY W. BRADLEY, D.D.S., M.D.S.
OTTAWA

PRESIDENT CANADIAN DENTAL ASSOCIATION

ORAL HEALTH

A JOURNAL THAT STANDS FOR THE "OUNCE OF
PREVENTION," AS WELL AS THE "POUND OF CURE"

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Roentgen Diagnosis and Technique of Minor Oral Surgical Operations

BY KURT H. THOMA, D.M.D., BOSTON.

Asst. Professor of Oral Pathology, Harvard University.

THE Roentgen method of examining the oral tissues and the accessory nasal sinuses has been proven to be of such great value that to-day no proficient diagnostician would depart from its use in routine examination. The patient is usually not aware of the disease, and the physician or dentist can only suspect diseases of the maxillae when he finds teeth with large fillings, gold or porcelain crowns, or discoloration.

COMPLETE EXAMINATION OF GREATEST IMPORTANCE.

When searching for infectious lesions to find the cause of some general systemic condition, it is of greatest importance to insist on a complete examination of all the teeth, and if any of those connected with the maxillary sinuses are infected, the nose, with its accessory cavities, should also be roentgenographed. To depart from a thorough routine examination often leads to regrettable oversights.

It is my firm belief that every new patient should have a routine roentgen examination before any type of dental treatment is begun. The person with absolutely sound teeth may, perhaps, be excepted. It is also in the interest of the patients to return at certain intervals for a new roentgen examination. It is surprising how dental caries starts in obscure places. The possibility of discovering a diseased condition before irreparable harm has been done, which sometimes even leads to the loss of the tooth, fully justifies this procedure. Many mistakes in treatment could be avoided by means of a roentgen diagnosis. I can recall many cases of cysts, which were treated for

months by applying antiseptic dressings to the root canals or by pulp removal from perfectly normal teeth. In other cases the patients were put to great expense for beautifully constructed bridge work, which only a few weeks later was found to be attached to badly infected pulpless teeth. Equally superficial is the treatment of the maxillary sinuses without investigating the dental condition. If an infected tooth has caused the sinus infection, it should be found and removed, but even in cases of nasal origin, a tooth may become a contributory factor in preventing complete recovery and may give rise to a recurrence.

The value of roentgen diagnosis depends upon correct interpretation of the picture, and such interpretation can only be made from a good roentgenogram. When reading a picture, however, one should not forget the history of the case and the clinical findings. The roentgenogram does not picture disease. It only records changes in the radiability of the tissues. These may have been brought about by pathological processes or by surgical and medicinal treatment.

A roentgen diagnosis is made by drawing deductions from the records made by the roentgen examination, and the roentgenologist must become proficient in associating roentgen signs with corresponding diseased conditions. In a roentgenogram of a tooth, for example, the picture of the pulp is the same, whether diseased or normal; but if a dark area, indicating decay, is shown in the crown of the tooth, one may suspect pulp disease. If there are symptoms, or clinical evidence, the diagnosis is fairly certain. If the picture, in addition to the above, shows changes in the bone around the apex of the tooth, the roentgenologist can, and without clinical indications, draw conclusions which lead to the diagnosis of pulp disease.

PERIAPICAL INFECTION.

The scope of this paper will not allow me to discuss the pathology of periapical infections nor their relation to general health. I also shall omit the acute type of this disease, but before starting with a description of roentgen findings in chronic periapical infections, let me say a few words to further substantiate the fact that the radiolucent bone area around the root apex is not "a circumscribed area, a minor and harmless thing," as some writers still believe, but a dangerous source of infection. With experimenting with exposure time, milliamperage and angle of the rays, I took sometimes a large number of pictures of one tooth and found that in several instances such teeth with radiolucent areas in the roentgen films developed very acute symptoms from nothing but repeated roentgen diagnosis.

In chronic periapical infections the following conditions should be determined by roentgen diagnosis:

1. The shape of the root should be known in case of root canal treatment as well as in case of extraction.

2. The condition of the root canal, either well filled, partly filled, apex accessible or apex closed.
3. Condition of the tissues at the neck of the tooth.
4. Condition of the periapical tissues.
5. Condition of the tooth apex.

KEEP THE ANATOMY IN MIND WHEN DIAGNOSING PERIAPICAL INFECTION.

The bone destruction at the apex of the tooth shows, as you all know, as a dark area in the roentgen negative, which is a picture of the radiolucent bone cavity. We may generally take the size of an abscessed area as an indication of the seriousness of the involvement of the surrounding tissues. There is an exception to be made, however, in the bicuspid and molar regions of the upper jaw, especially if these teeth protrude into the maxillary sinus. It should be borne in mind that when there is only a very thin film of bone over the roots of such teeth there is no chance for extensive bone destruction, and cases which show the smallest shadow are more liable to be the cause of sinus disease than larger areas separated from the antra.

Variations in the intensity of the picture of an abscess cavity have, to my mind, to do with its anatomical location. The defect in the bone consists, as is evidenced by examination of skulls, of a cavity due to bone destruction, with osteoporosis of the surrounding bone. This decreases the resistance to the roentgen ray. The degree to which this is registered depends upon the location of the abscess cavity. If the outer or inner cortical plate of bone has become perforated we get a deeper shadow than from a cavity in the cancellous bone between the two thick, unaffected cortical plates of the mandible. Again, if the apex of the root is close to the surface, as is often the case with upper incisors, we may find that there is only a shallow depression in the surface of the bone. This would give a very indistinct picture, and the structure of the underlying cancellous part of the bone could probably be distinctly seen in the area on the film.

The most important information which the roentgen picture gives in cases of periapical infection is the condition of the tooth tissues at the apex of the root. A tooth which has been surrounded for a long time by an abscess becomes pus-soaked, and forms an obnoxious foreign body, which can be best compared with a bone sequestrum. Microscopic examination shows that absorption takes place, which can be recognized in a good roentgen film, first by an indistinct outline of the tooth, later by roughness and loss of tissue. Evidence of such absorption indicates that nature wants to dispose of this tooth. No antiseptic treatment can restore it to normal and it is a case for surgical treatment.

In cases of extraction it is also important to find out whether the root of a tooth is enlarged, due to hypercementosis. Such teeth should be removed by the use of a different technique than that used in ordinary extractions.

THE RELATION OF DENTAL DISEASE TO DISEASE OF THE MAXILLARY SINUSES.

Infection of the maxillary sinuses is quite frequently of dental origin, and in many other cases diseased teeth become an important contributory cause. Chronic dental infection, such as occurs on pulpless teeth, is frequently the etiological factor. Chronic infection of the maxillary sinuses, with polypoid degeneration of the mucous membrane, often develops without the patient's knowledge, and is discovered only in routine examination. If, therefore, infection of the maxillary molars and bicuspid is diagnosed from the roentgen picture, sinus disease should always be considered as a possibility, and roentgen pictures of the head should be taken for investigation. On the other hand, in cases of sinus symptoms, or sinus disease, roentgen investigation of the teeth should not be neglected, before any treatment is undertaken.

It should also be remembered, in connection with a probable dental cause, that a small shadow around a root does not necessarily mean that the dental condition is negligible, because, in some cases, there is not enough bone between the sinus cavity and the alveolar socket to become destroyed, and formation of a large abscess cavity is impossible. Such a condition is more liable to cause sinus infection than a tooth with an extensive abscess cavity well removed from the floor of the sinus. This is well illustrated in my own case. The pulp of the right maxillary bicuspid was removed several years ago, on account of an exposure made by the dentist when preparing a tooth for a cohesive gold filling. About one year ago, a reontgenogram was taken, which showed a very slight periapical infection. The root canal was treated experimentally by various modern methods, and then filled under strict asepsis. A bridge was attached to the tooth, and some time later it became slightly tender, until one morning a fullness and throbbing sensation was felt in the region of the right maxillary sinus when stepping hard. A small amount of gelatinous substance was discharged through the right nostril. An anterior-posterior roentgen picture, taken the same day, showed that the right maxillary sinus was cloudy. On transillumination it was entirely dark. The tooth was extracted at once, and a probe passed into the alveolar socket showed that there was no opening through the floor of the antrum. No further treatment was resorted to; the symptoms disappeared, and, after seven weeks, the sinus was clear on transillumination and in the roentgen picture. Another picture

taken from Water's position a year later showed that the maxillary sinus had remained normal. This case also teaches that it is not necessary for the dental infection to have direct communication with the cavity of the sinus. The infection may spread through the Haversian canals of the bone.

Dental cysts sometimes invade the maxillary sinuses.—Periodontal cysts developing from the maxillary bicuspid or molars, or dentigerous cysts originating from misplaced tooth germs, often encroach upon the maxillary sinus. In three cases of periodontal cysts which I have observed, the lesion was so large that it filled the sinus cavity almost entirely. In all three there was a thin, bony wall separating the remaining part of the sinus from the cyst cavity. The roentgen picture shows radiopaque tissue in the lower part of the maxillary sinus. This is nearly always separated from the normal part (which remains radiolucent) by a clear, well-defined light line, usually a segment of a circle. A dental film should be taken to show the relation to the teeth.

IMPORTANCE OF EARLY ROENTGEN DIAGNOSIS.

Extensive lesions of the maxillae, such as otitis, osteomyelitis, and cysts, remain generally undiscovered for a long time. Not accompanied by any distinguishing symptoms, pulpless teeth associated with them, according to the histories of many cases, are often treated for months by means of root canal medication without an accurate diagnosis, such as could have been made by the use of the roentgen ray. The jaws, therefore, are frequently seriously involved when the patient finally consults a roentgenologist or oral surgeon. Every dentist should be familiar with the various types of bone infection and their clinical and roentgen aspects. The following are a few cases in which the true nature of the disease was not recognized in the beginning, because no roentgen examination was made.

Case of diffuse osteomyelitis.—The patient had had pain on the right side of the jaw for several weeks. He had had several teeth treated and afterwards extracted. There were very marked constitutional symptoms, and the patient was in bed five days. When last seen by his dentist, extraction of the left mandibular third molar was advised. This was the only tooth remaining on that side. Examination showed swelling on the cheek and a fistula discharging pus into the mouth. The third molar was perfectly firm, but the incisors were tender on percussion. Temperature, 100. Pulse good. No severe pain. Roentgen examination of the jaw advised, which showed large pieces of bone, separated by dark shadows, indicating extensive osteomyelitis of the mandible, with several sequestra.

Case of cystic odontoma.—The patient, a boy of 16 years, had noticed a swelling under his upper lip for several months, the left

maxillary lateral and central incisors being somewhat tender to touch. His dentist opened the lateral incisor, removed the pulp, and treated the root canal. Whenever the root canal dressing was removed, a yellowish fluid escaped from the tooth. The root canal treatments failed to help the condition, and the gum was lanced several times, without result. When the boy was first brought to me for consultation, a roentgen picture was taken, from which a diagnosis of cystic odontoma was made, the dark area, with definite outline, indicating a cyst cavity in the bone. The radiopaque substance in the centre of the cyst is an odontoma.

Case of pus discharge persisting after extraction of a tooth, the cause being an infected cyst.—In this case there was pus discharge from a fistula on the gum over the right maxillary incisor. The central incisor had been extracted and a bridge constructed to replace the tooth, but pus continued to discharge from the socket. A roentgen picture revealed a cystic cavity, partly connected with the socket of the extracted tooth, and the apex of the lateral incisor protruded into it. The discharge from the socket came from an infected cyst.

Case of extraction of teeth without diagnosing a large cyst.—The patient (Mrs. C. E. B.) complained of indefinable, dull pressure in the right side of the maxilla. At times she noticed discharge of pus on the gum, which, when it occurred, relieved the pressure. Several teeth had been extracted at different times, with only temporary relief. Examination showed a large swelling on the entire right side of the hard palate. When the alveolar process was punctured through the socket of one of the extracted teeth a yellowish fluid was released. Roentgen examination revealed a large cyst extending into the maxillary sinus and palate.

All these cases illustrate the great aid of the roentgen examination in diagnosis, and that a careful, systematic investigation is absolutely essential when treating surgical diseases of the jaws. The general practitioner who realizes this will see the advantage of making an appointment for examination first, when referring his patient to the oral surgeon, which will also give the latter the opportunity to determine whether the case is suitable for the office, or whether it should be taken to a hospital, and whether local or general anesthesia is advisable.

MINOR ORAL SURGICAL OPERATION. DIFFICULT EXTRACTION OF TEETH.

Conditions which make the extraction of teeth difficult are the following:

- (a) Abnormal position of the tooth. Under this heading belong all impacted and unerupted teeth, the removal of which I shall consider separately.

- (b) Abnormal formation of the tooth. Bent or curved roots, abnormal formation of cementum, causing exostosis on vital teeth.
- (c) Changes of the tooth tissue. Pulpless teeth which have been cut off from nutrition for several years become very brittle, and are not strong enough to be removed by means of forceps.
- (d) Pathological changes at the apex, causing either hypercementosis or ankylosis between tooth and bone.

Diagnosis.—The diagnosis is made by means of one or more roentgen pictures.

Operation.—If the case is considered a difficult extraction, the operator should resist the temptation to try the forceps first, because unsuccessful attempts make not only a bad impression on the patient, when local anesthesia is used, but will also cause unnecessary destruction of the surrounding tissue.

The technique should be carefully planned, keeping the following rules in mind:—Safeguard the soft tissue by means of incision flap and protecting retractor. Cutting the tooth into parts is preferable to destruction of bone. If bone must be removed, preserve the alveolar border if possible, remove a septum between two roots rather than the cortical plate. Only if these methods are not applicable should we choose the removal of the labial or buccal cortical plate. After removal of the tooth, smooth the margin of the bone wound by means of a large surgical burr, and look carefully for fractured pieces of tooth, bone or filling material which may have dropped into the socket. Place the soft tissue flap back into its place, and secure it by means of one or two horsehair sutures.

Post-operative treatment.—Post-operative treatment is of great importance. No matter how skilfully the operation was performed, swelling or post-operative pain, or both, must be expected, and after performing a painless operation the patient should not be left in ignorance regarding the possibility of post-operative effects. The susceptibility of the individual plays an important factor; it is influenced by race, temperament, mental attitude and state of health. The highly nervous patient will exaggerate, but, just the same, the suffering is real to him. With a little forethought, it is possible to keep the patient comfortable. Swelling of the face can be prevented to some degree by advising the patient to use cold applications, such as an ice-bag, soon after the operation; it should be kept one hour on and one hour off. For pain, give the patient also instruction for palliative measures. Prescribe an anodyne, such as empirin gr. X.; in more severe cases, empirin and phenacetin, gr. V. of each. I often give the patient the latter right after the operation, when performed in the office, directing them to repeat when they feel the pain come on. If these drugs are not sufficient, phenacetin gr. III.,

sodii bicarb. gr. V., codeine sulph. gr. $\frac{1}{4}$, and caffeine gr. I., in capsules or powders, may be given. Repeat after three hours if not relieved. Remedies applied on dressing may be used; guaiacol and glycerine, equal parts, applied on a piece of sterile gauze, is often very effective. I prefer to let a blood clot form in the wound, as it insures quicker healing, and only use a dressing in cases which do not heal promptly. Every case of difficult extraction should be seen at least once more, and generally daily until healing has been completed.

THE REMOVAL OF BROKEN ROOTS.

This includes roots broken while attempting an ordinary extraction, roots which remained in the jaws from past incomplete extractions and have become enclosed in the bone, covered over by bridges or impacted between roots of teeth which moved together.

Diagnosis.—Locate the root by means of one or more roentgen pictures or by means of a stereoscopic picture. Note anatomical relations such as the inferior dental canal, mental foramen, or maxillary sinus, and plan the operation so as not to interfere with them.

Operation, by removing the root through the alveolar socket.—This operation is applicable for cases of recent standing, the alveolar socket not having healed or being filled with fresh granulation tissue.

(a) In multiroot teeth. Clean out the socket, irrigate with warm sterile saline solution, and stop the bleeding with adrenalin if necessary. Remove the inter-alveolar septum with a burr, and raise the root with an elevator.

(b) In single-rooted teeth. A U-shaped incision is made, and the mucoperiosteal flap raised from the bone and retracted. With burr, cut an opening through the outer cortical layer of bone, so as to reach the apex of the tooth. Enlarge this opening sufficiently so as to bring the root end into full view, then insert a fine-bladed elevator underneath the root and push it out of the socket, from where it can be removed with forceps. Remove infected tissue if there is any, smooth the bone margins, and replace the flap, securing it with horse-hair sutures.

Post-operative treatment, as for difficult extractions.

Operation by removing root through alveolar window.—This method is used if the root is under a bridge, if the alveolar is closed and the gum normal at the alveolar crest, and when the neighboring teeth have moved together, causing impaction of the root.

Expose the bone by the flap method just described, cut a window through the outer layer of bone by means of chisel, or with burr, and expose the root, but leave the alveolar border intact. To further safeguard the alveolar border, and with it the shape of the gum, remove the root with the apex coming out first. An elevator will do

this easily. Smooth bone, apply iodine, let fresh blood fill the cavity, and suture the flap into place.

APICOECTOMY.

Apicoectomy, or root end resection, has the purpose of eliminating not only periapical infection, but also the part of the tooth which is the main cause of these latent infectious lesions, namely, the necrosed root apex. The operation may be performed on one or several adjoining teeth.

Prognosis.—In well-selected cases, this operation, if carried out properly, will show a very high percentage of success. Patients with marked lowered resistance, and those suffering from other foci of infection, are not suitable for this operation.

Prognostic Roentgen Examination.—Before undertaking apicoectomy on a tooth, the condition should be carefully studied. With the aid of the roentgenogram, observe the shape of the root and the extent of the abscess cavity. If too much of the root has to be excised, there will not be enough alveolar process left to hold it firmly after the operation. A tooth with alveoloclasia is, for the same reason, not favorable. Neither should a tooth be operated upon if there is another infection in the immediate neighborhood, as this would, directly or indirectly, re-infect the healing tissue.

Treatment of the Root Canal.—Apicoectomy is only successful if the root canal has been sterilized and properly filled previous to the operation. It is not sufficient simply to amputate the root where the old filling ends; but the root canal and dentinal tubules have to be sterilized, or there will be re-infection from the tubules exposed where the root is cut. If it is not worth while to remove a crown and treat the root canal, the tooth should be extracted, or there will be recurrence (with or without symptoms), and the patient is as badly off as before.

Preparation for the Operation.—The operation should be performed on the principles of aseptic surgery. The patient is covered with a sterile sheet, and in order to exclude the hair, the head is covered with a sterile towel, except over the eyes, nose, and mouth.

Operation.—The lip is retracted by the assistant with a lip retractor. One sterile sponge is placed on either side of the part that is to be operated, so as to prevent saliva entering the field of operation. The mucous membrane is dried with sterile gauze and painted with 3½ per cent. tr. iodine. With a flap knife, make a U-shaped incision. Lift the periosteum and gum from the bone with the sharp periosteal elevator. Insert a suitable gum retractor, and use gauze to remove the blood. The alveolar process is now visible if it has not been destroyed by the infection. A good-sized opening is cut with the chisel and mallet, or by aid of the burr, to get a clear view of the apex of the

root. Resect the apex with a fissure burr as far toward the cervical part as is necessary to remove all parts which are necrosed. Remove the resected apex with a suitable elevator. The granulation tissue is removed with a curette, or with a round burr, or both, until healthy bone is visible on all sides. Smooth carefully with the burr all sharp points and margins of the alveolar process. Do not shape the distal part of the tooth like the end of a root, as is sometimes advised, because this decreases the amount of attachment with the bone. I prefer to have one round, clean cavity without anything projecting into it. Wash with normal salt solution, remove all the debris, sponge, and sterilize the whole cavity with $3\frac{1}{2}$ per cent. tr. iodine. Remove the excess with sterile sponges and stimulate bleeding with a suitable instrument. When the cavity is filled with blood, draw the flap over the opening, and sew it carefully with three horse-hair sutures.

Post-operative care.—Swelling of the lip, when the operation has been performed on anterior teeth, must be expected, but does not always occur. Cold applications, as described, can be recommended for prevention. Pain is unusual.

Healing.—If proper aseptic care has been taken, a good union of the gum is obtained in a short time. The stitches are removed after three days, and if horse-hair has been used, this causes little or no discomfort. In my mind, the sewing in the mouth is of greatest importance; it prevents re-infection from saliva and the fluids of the mouth. The healing of the bone cavity occurs by organization of the blood clot, and bone is later formed from this tissue. In some of the radiographs it can be seen how the trabeculae of bone grow into the cavity. Ultimately, the tooth becomes ankylosed at the end to the newly-formed bone.

EXTRACTION OF TEETH AND PREPARATION OF JAWS FOR DENTURES.

To my way of reasoning, the most important part in removing all the teeth for full dentures is the preservation of the bone of the alveolar process. It is true that in a number of cases a piece of the alveolar process adheres to a tooth and is fractured and removed, but I do not think that this is a good reason for chiseling away the outer alveolar plate in every case.

Diagnosis.—Roentgen pictures should be taken of all the teeth to locate periapical bone infections and teeth presenting difficulties in extraction.

Operation.—All easy extractions are done first. Next we take the difficult extractions and imbedded roots. After all the teeth are removed, infected granulation tissue is curetted through the sockets and all debris cleaned out of the wound. The gum is then trimmed

with knife, or scissors, and elevated from the alveolar margin for a very short distance. After inserting a retractor to protect the soft tissue, a large, round surgical burr is used to plane down sharp ridges of bone and round overprojecting corners. When the entire bony ridge is so prepared, we bring the gum margins together and suture.

Healing.—If all sharp places have been removed under the gum, a plate can be worn after a few days with a great degree of comfort.

THE REMOVAL OF IMPACTED LOWER THIRD MOLARS.

As there are so many different positions in which we may find an impacted third molar in the lower jaw, let us first consider how we can classify the different types. Clinical examination will show that the impacted molar is either normal or causing infection of the surrounding tissue; we find it either unerupted or partly erupted.

Roentgen Examination will determine its shape and position. The tooth is either straight, or curved mesially or distally, and the position may be—1, upright; 2, mesio-oblique; 3, disto-oblique; 4, mesio-horizontal, and 5, the tooth may show lingual or buccal displacement.

The roentgen picture should give information about all these points, and, therefore, it is important that there is as little distortion as possible, and that the entire tooth is shown. Place film as far back into the mouth as possible, the upper edge parallel with the occlusal plane of the molars and bicuspid, and the rays directed vertically on the film. When the tooth is in an unusual position, an extra-oral plate should be taken.

Operation.—In planning the operation we must determine:

First—In which direction the tooth can be moved. If it is upright, straight, without curvature at the roots, it can be removed in a vertical upward direction. If the tooth is curved, it must be removed in the direction of its curve, no matter what its position.

Second—What are the obstructions to its removal? If the tooth is to be rotated distally, a certain amount of bone will be cut away at its distal side; if it is to be rotated mesially, obstructing bone at the mesial side will have to be removed. Sections of the crown may have to be taken out separately, to overcome difficulties such as impaction under the second molar, or to create a space into which the rest of the tooth can be rotated. I prefer to remove the tooth in sections, instead of removing large portions of the jaw.

An operation performed skilfully is better than an operation performed with great force, and the time factor is of no importance when accidents, such as fracture of the mandible, injury to the inferior dental canal, and trauma of the second molar, can be prevented.

1. *Simple lever technique.*—Partly erupted teeth are often only covered by mucous membrane, and can be removed by means of lever

action after the gum has been incised sufficiently to allow the tooth to pass through. A straight, bayonet-shaped lever is applied on the convex side of the tooth. Rotation of the lever will cause it to be dislocated and raised. To determine the distribution of the force applied, keep in mind the parallelogram of forces, and you will know how much of the force will act in a vertical direction and help to raise the tooth, and how much will act in a horizontal direction. The latter will help to rotate the tooth, and if it is very much greater than the former, and resisted on the other side of the tooth, it causes fracture of the jaw.

2. *Lever technique with bone resection.*—An incision is made along the lingual side of the post-molar triangle. This is continued immediately behind the second molar. Proceed at rightangles to the first incision, and extend it well down on the buccal side of the gum. Detach the muco-periosteal flap from the bone and insert a retractor. With a surgical burr, remove all bone overlying the crown of the tooth. You have determined from the roentgen picture whether the tooth can be raised vertically, or whether it is necessary to rotate it.

If the tooth can be elevated vertically, insert an elevator at the buccal side of the tooth, and, using the thick cortical bone at the outside of the mandible as a fulcrum, dislodge and raise the tooth. It may be necessary to drill a hole into the buccal side of the tooth, into which the tip of the elevator can be inserted.

If the tooth is curved and has to be rotated, it is necessary to resect additional bone to furnish space into which the tooth can be moved. This, again, is accomplished the quickest with a surgical burr. The next step is to apply force by lever action to dislodge the tooth.

3. *Lever technique with tooth resection.*—The tooth is exposed as just described, but instead of creating the needed space for rotation of the tooth by resection of bone, a slice is cut off the tooth instead. If the tooth is to be rotated distally, both methods can be employed. If the tooth is to be rotated mesially, resection of bone would cause injury to the peridental tissues of the second molar, while oblique resection of the mesial part of the crown will furnish space without endangering neighboring organs. If the tooth is in a disto-oblique position, an oblique slice of the entire crown is removed.

The resection of the tooth is made with a burr in a rightangle hand-piece. The smaller piece of the crown is removed first with an elevator, which has a long, narrow blade extending out at rightangles. The remaining part, with the root, is then taken out after dislocating it with a lever applied at the convex side of the tooth, or by means of an elevator with heavy rightangle blade, inserted into the pulp chamber.

4. *Bisection of the tooth.*—This method is used when rotation of the tooth would dislocate the second molar. The tooth is exposed as described. With burr, we bisect the tooth at a convenient place. The nearer the neck of the tooth this is done the easier will it be, because of the thinness of the enamel at this part. This procedure should also create sufficient room to allow for easy removal of the crown with an elevator. Sufficient bone is then resected to allow rotation of the root, which is accomplished by the use of an elevator either in the pulp chamber or on the buccal side of the tooth.

Dressing of the wound.—After the tooth and roots are completely taken out, a large, round surgical burr is employed to eliminate all sharp, bony projections, and after swabbing out with tincture of iodine, the flap is sutured into place.

After care consists in rest, cold applications on the outside of the face, daily irrigation with a mild antiseptic solution, and prescription of anodynes for pain, if needed.

THE REMOVAL OF IMPACTED MAXILLARY THIRD MOLARS.

Impacted maxillary third molars are also either partly or entirely unerupted. With the exception of very rare instances, they are in a mesio-oblique position.

Operation.—Make an incision over the crest of the tuberosity, nearer the palate than the cheek. Extend this incision in a vertical direction over the buccal part of the gum and raise the muco-perio-steal flap. The location of the mesial side of the tooth has been estimated from a study of the roentgen picture. Insert an elevator with a sharp, fine rightangle blade through the thin buccal plate of the alveolar process, and by rotating the instrument dislodge the tooth and press it down into the wound, where it can be taken hold of with forceps or pliers. In some cases it may be necessary to remove a certain amount of bone over the occlusal surface of the tooth. Replace the flap and fasten with one suture.

THE REMOVAL OF IMPACTED MAXILLARY CUSPIDS.

It is advisable to remove impacted cuspids at an early age when found, because the dental follicle at this age is fairly thick, and facilitates the operation. In older people it is better to bisect the tooth, because the application of undue force causes quite often injury to the lateral incisor tooth.

Diagnosis.—The buccal, or palatal, position is ascertained either by stereoscopic roentgen picture or by means of two exposures. Raper's rule is: The impacted cuspid, when located in the palate, changes in the picture in the same direction in which the tooth is shifted for the second exposure.

Operation.—Make an incision along the alveolar margin of the

gum, and extend it in the median line posteriorly, avoiding too close proximity to the incisive foramen. Raise the muco-periosteal flap, draw a silk suture through it, and pull it back, fastening the silk between two molars on the opposite side.

Remove the bone over the tooth with chisel; the apex and tip of the crown do not need to be exposed. Bisect the tooth with right-angle burr, and remove crown first and the root later, inserting the elevator into the pulp chamber or the palatal side of the tooth.

After complete removal, smooth the bone and fasten the flap into place with three sutures.

ARTIFICIAL ERUPTION OF CUSPIDS.

Unerrupted malposed cuspids can be erupted artificially in young people up to the age of 25. The tooth is led into its normal place by means of slight pull applied by an orthodontic appliance. An extension from the arch wire can be tied to the tooth for this purpose.

Operation.—The operation consists of making a circular incision clear through the periosteum, and down to the bone. Remove entirely these tissues, so as to make an opening slightly smaller than a penny. If local anesthesia is used, there is very little bleeding. If the operation is performed under a general anesthetic, however, it is advisable to also use a local anesthetic to decrease the bleeding, or apply adrenalin from time to time for its haemostatic action.

The bone over the crown of the tooth is next removed by means of small chisels, and, if the right place has been selected, the white enamel will be visible as soon as the first piece of bone is removed. Sufficient bone is then cut away to expose the entire crown of the tooth. Burrs may be used for this purpose if they are very carefully handled, so as not to injure the enamel. After this is done, the bone is removed in the place where the tooth is to erupt, so that there will be a free space into which the tooth may be moved. The tissue next is cauterized with an electric cautery to prevent as much as possible granulations closing up the wound. Pack with iodoform gauze, or, better still, very soft, thin rubber tissue.

After two days, a hole is then drilled into the tooth at a suitable place, according to the surface exposed, and a previously-prepared platinum loop wire cemented in. The extension wire from the orthodontic arch is attached to this loop by means of a wire, or ligature, and adjusted so as to exert slight tension, which is applied continually until the tooth has been erupted enough to attach to its crown a band. The rest of the treatment is an ordinary orthodontic problem.

The scope of the two subjects of my paper is broad, and can be elaborated in many ways and extended in various directions should the time permit. I hope that my selection has been interesting to you and has developed thoughts in your minds which will further this branch of our profession.

Full Denture Construction for the General Practitioner

BY I. LESTER FURNAS, D.D.S., CLEVELAND, OHIO.

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PREFACE.

IN preparing the following work on full denture construction for the general practitioner the most difficult problem which the author has been called upon to face has been one of selection. The variety of methods and the wealth of material to draw from have made this no easy task.

The author makes no claim for originality, and wishes to give due credit to those who have contributed to him so freely of their knowledge.

The technic outlined has stood the test of use and is believed to be thoroughly practical.

The author has tried at all times to avoid advising materials or instruments that are not a part of every modern dental office equipment.

This work is not for the specialist in full denture construction. To him most of it is already a matter of daily routine. It is intended to interest the general practitioner of dentistry who graduated before many of these things were taught in the dental colleges, and who has not had the time or the inclination to do post-graduate work in this subject. If he can get only two or three suggestions that will enable him to make better dentures, the author will feel that his efforts have not been in vain.

A BIT OF HISTORY.

The subject of artificial denture construction in the past few years has received as much as, or more attention than any other single branch of the dental profession. I believe that more rapid strides toward success have been made in this line than in any other.

Until about 1910, prosthetic dentistry in general had been allowed to lapse almost into disrepute by the dental profession. By a majority of the members it was looked upon as a drudgery so tiresome and so dirty that it was beneath the dignity of a professional man. Most of this work was being placed in the hands of men or boys in the laboratory who performed their duties according to certain rules or routine and with no regard whatsoever for the individuality of the case in hand. Naturally enough, the fees for almost all types of prosthetic restorations lapsed into a semi-attractive state, and the general practitioner was more than ever loathe to leave his operative work for the less attractive and less remunerative prosthetic case.

When Dr. Wm. Hunter, of England, pronounced the benediction upon certain types of what he called "American Dentistry" and was soon followed by Dr. E. C. Rosenow, and the theories of focal infection began to be more or less accepted, a great change began to take place. It is doubtful if any other profession ever experienced such radical and sweeping changes in theory and practice in so short a time. From the ultra-conservation of teeth the profession almost to a man turned to what might be called wholesale extraction. Clinics at dental conventions ceased to show "dental splints", root-canal techniques, methods of treating apical abscess, and systems of building up decayed and broken-down roots, and in their place were found a variety of new extracting methods, curetting, x-ray diagnosis and similar subjects.

The public, informed through many articles in the press, became alarmed. Patients who had formerly had expensive bits of various types of bridgework placed in their mouths, now demanded its removal. When there was any question as to the advisability of removing a tooth, the dentists usually furnished the expert testimony and advice that condemned said tooth, and it was sacrificed along with the rest.

If the patient's health is to remain at par when natural teeth are removed, serviceable and efficient artificial substitutes must be supplied. The great increase in the number of edentulous patients now brought the dentist face to face with a new and extremely troublesome question: How were these patients to be supplied with serviceable and efficient substitutes? The very definite demand for a much higher type of denture-service presented itself. Patients were not satisfied with the stereotyped standardized "false teeth" generally produced. They demanded an artificial restoration that was not only serviceable and efficient for masticating purposes, but that also had natural appearance and was artistically constructed to harmonize with the individual characteristics of the patient. It was largely this demand that stirred the dental profession to action. Almost immediately research workers, both as individuals and study clubs, began to give to full denture construction the attention that it deserved. Theories, techniques, and materials began to be rapidly improved and the results obtained have been most gratifying. The magnitude of the subject can scarcely be realized and the results to date are far from final. The improvements obtained have stimulated such an interest in this great work that one dare not predict the future goal.

The skill and knowledge necessary for the successful construction of a comfortable, efficient and esthetic set of artificial dentures is not surpassed by that required for any other operation in connection with the human body. The operator must be thoroughly familiar with anatomy, dental anatomy, histology, pathology, and chemistry. He must know art as relates to color and harmony of form, and physics

as relates to stress, leverage, expansion, contraction, and the various changes that the different materials undergo during the process of construction. He must possess a mechanical skill capable of an exactness that should not be exceeded by that of a watchmaker. The modern prosthetist knows that in order to accomplish the desired results there are absolutely no "short cuts." He realizes that there is a reason for every step in the process of construction and that there is also a very definite scientific reason why that step should be performed in a certain definite way.

There are four words that should be posted in a conspicuous place in the laboratory of every dentist:

NEATNESS—CLEANLINESS—ACCURACY—DETAIL.

The word *neatness* should be in sight because any work carelessly done never can be expected to product finished results. Casts carelessly mounted upon an articulator with plaster of Paris smeared here and there in a careless manner, cannot possibly bring out the defects of articulation, waxing and festooning as would be revealed were the same case mounted with care and neatness. The pleasure that is added to working with a neat piece of technic is a great incentive to the operator constantly to strive to do a better piece of work.

CLEANLINESS.

How often do we go into a dental office and there find everything the acme of cleanliness and perfection until we reach the laboratory? No wonder that this man has no use for the laboratory-side of dentistry and denounces it as being dirty and uninteresting. It is so, just because he has made it so. The best and most interesting work never did and never will come out of a dark, dirty laboratory. The fees for inferior work done under such unfavorable conditions always will be small in proportion. The day is long past, if it ever existed, when a dentist in planning his office should provide for everything else and then take what is left for the laboratory. Sometimes one wonders if it might not be a good plan to have all patients enter the operating room through the laboratory.

ACCURACY AND DETAIL.

The almost total loss of accuracy and detail in the technic of construction of prosthetic restorations has been like a mill-stone around the neck of a drowning man. Knowing full well how much these two essentials mean to the ultimate success of the case, how often do dentists satisfy themselves with the thought: "Oh! that's good enough." How often we are confronted with the friend who favors us with a "short cut" or "easier way." It is not meant that there is but *one way* to do a thing, but I do mean and believe that the average "short cut" in prosthetic dentistry is an illusion and a snare and something to guard against.

During the past few years there have been given to the dental profession approximately six separate and distinct technics for artificial denture construction: the Snow, Gysi, Hall, Monson, Needles, and Hanau. In here treating this subject of full denture construction, let it be definitely understood that no opinion herein expressed is meant as a criticism of all or any part of these various technics. The author has the highest possible regard both professionally and personally for each of the men who originated these systems. Each of the technics when carefully followed will produce gratifying results.

In the chapters which are to follow, it is planned to outline in detail a practical systematic technic of artificial denture construction for the general practitioner of dentistry. No claims whatsoever are made for originality in this work, but the attempt has been made to compile from all the various methods the simplest possible practicable technic, a technic which has stood the test of time and has proven most valuable during the twelve years of experience as a dental teacher.

THE USES AND ABUSES OF THE COMMERCIAL DENTAL LABORATORY.

The hypersensitiveness of the average edentulous patient in regard to appearances is an old story. The gratitude and appreciation of patients who are given life-like and serviceable artificial substitutes, is also an old story, but one too seldom told in the average dental practice. When the dentist completes and delivers a satisfactory set of artificial dentures and the patient is well pleased with both service and appearances, (especially in cases where the patient has had a great deal of denture trouble) it will be found that there is no more appreciative class of patients, as a whole, than that to which he belongs.

The artistic or esthetic side is of the greatest importance to the patient and should be carefully studied by the dentist. If the appearances of the dentures meet with the patient's expectations, faulty articulation or adaptation may be and many times is forgiven, but the reverse of this is never true.

How, then, can the dentist best give service as regards the esthetics of an edentulous case? In a later chapter the question of esthetics as regards face and tooth-form will be discussed in some detail, but it is desirable here also to touch upon it in a very general way.

There are no two cases of artificial denture construction that are exactly alike any more than there are two faces that are exactly alike. To take an upper and lower impression and then turn it over to some one else to complete, the construction of the dentures, even though he be a dentist, unless he have access to observe and study the case, is just as foolish as it would be for an artist to paint a picture of a man's face and then proclaim to the world that his picture was an exact likeness of every other human being in the world. On the other hand

the dentist has just as much opportunity to inject his own personality and "action" into his denture construction as has the artist who paints a beautiful picture. I dare say that you would search for a long time before you could find a real artist who would prepare his canvas and then roughly sketch the outlines of his picture with chalk and then turn it over to some novice or understudy to complete the picture; and yet that is exactly what thousands of dentists are doing every day.

It is not desirable here wholly to condemn the commercial dental laboratory, for it is an institution that is here to stay, and is in many ways a valuable asset to the profession; but it is exceedingly desirable that there should be a closer relationship existing between the two.

Let us say that there are three ways in which prosthetic work may be done by the general practitioner:

First.—The ideal way would be for the dentist to keep himself in constant touch with every step of the work by doing it all himself. This would give him the opportunity to study carefully all the peculiarities of the individual case and to inject his art, or really himself, into every detail of construction just as the artist paints his picture. This of course is not practical because we all know that very few men in the general practice of dentistry have the time or get the fees that would permit doing this.

Second.—Our next choice would be for the dentist to do all of the work that he possibly can, and then turn it over to a competent laboratory assistant to perform such parts of the technic as he may require. This will enable the dentist to inject his personality into the work through the medium of his personally-trained assistant, who is continually under his personal supervision. This plan is found many times to be impracticable. Often it is almost impossible because such assistance is frequently difficult to find. Therefore we are driven by necessity to use our:

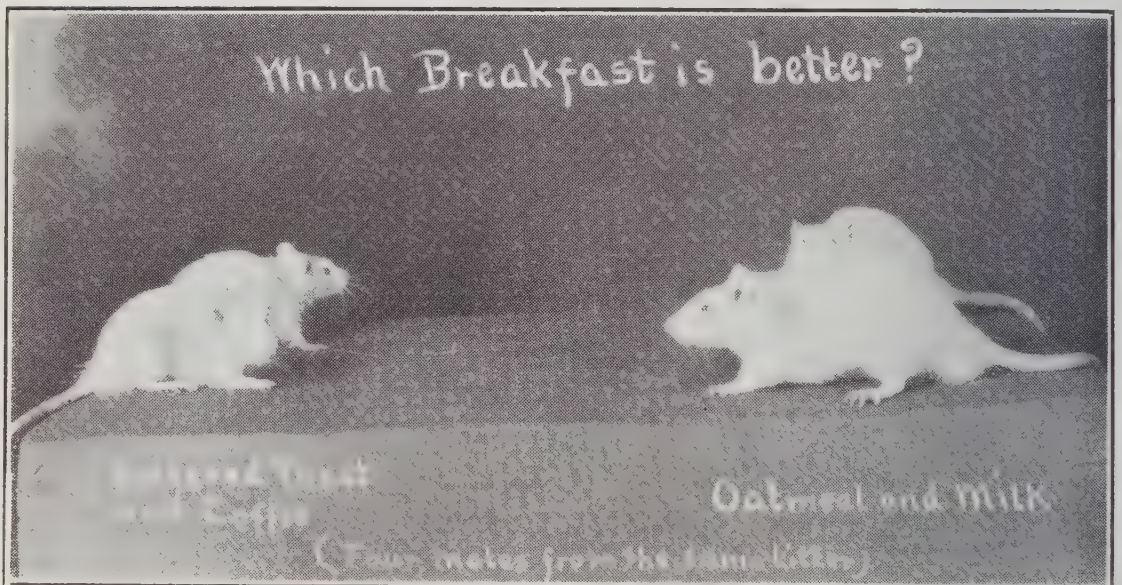
Third choice.—Here the dentist does all the work that he possibly can and then sends the balance to the commercial dental laboratory. Where this plan is followed, (and it is by far the most popular), it is of the utmost importance that the dentist be in the closest possible touch with the laboratory and that the laboratory man be as thoroughly familiar with the dentist's technic as possible, and that he be furnished plain, concise, and complete instructions as to just how he is to proceed.

It often seems to me that the average laboratory man has never been given the chance that he deserves. He has been held at arm's length, or pushed off to himself because he was "only a laboratory man." Ofttimes he is almost forced to steal what dental knowledge he must acquire for his work, and this seems a very wrong and narrow policy on the part of the dentist. The dental laboratory man is here and he is here to stay; and the dental profession is going to have to use his services; therefore, if for no other reason than our own selfish inter-

ests, this man should be assisted and developed to the highest possible point of efficiency. Can there not be a place made for him as an associate or inactive member in our local societies? Give him a place and make him feel welcome and free to ask questions and learn about the work that you are doing and want him to do, and, incidentally, he may be able to tell you many interesting and helpful things. If he is at all frank, as he should be, he may also tell you a few things which you are doing that force him to render you inefficient service. If we must use the dental laboratory man efficiently then he must know our needs and the only way for him to know them is for us to tell him.

624 Hanna Bldg.

(To be continued in next issue of ORAL HEALTH.)



THE results of an experiment to test the comparative food value of milk and oatmeal with coffee and buttered toast are quoted in a recent bulletin of the Nutrition Laboratory of Battle Creek Sanitarium. Judging by the photographic record, oatmeal and milk wins hands down.

In the experiment, four male rats of the same litter were taken. Two were placed in one cage and two in another. In one cage the animals were fed upon nothing but buttered toast and coffee. Those in the other cage were given oatmeal and milk. The results in the rapidity of growth of the animals were most striking, and in the photographs the difference may be noted.

The bulletins point out that the milk used in the United States in the course of one year, if placed where it might be contained, would be sufficient to float all the navies of the world.

The bulletin goes on to say:

"Milk is our most perfect food. It contains all of the ingredients

necessary to sustain life, and in the most perfect proportions. It is nature's own food. In our early life it is our only food.

"Fat and sugar for energy and fuel, lime and minerals for the bones and the teeth, proteins and albumen for sinews and brawn, vitamins for growth and nourishment—this is found in milk. A balanced mixed ration in one food, giving, as Rosenau says, the same nourishment as 'a meal made up of meat and eggs, sugar and cereals, oils and fats, with salt and water.'

"Milk is cheap, even though its price may be comparatively high, for in almost every instance more food value is obtained for the money spent in milk than in other foods. The food value of one quart of milk is about equal to eight eggs or three-quarters of a pound of lean beef.

"Milk should form a regular part of our diet, for, used in generous combination with other foods which provide bulk, such as vegetables, bread, meats, and others, it insures that one gets the various food elements needed by the body.

"Drink milk, pure milk, and plenty of it."—*The Canadian Red Cross.*

A Few of the New Viewpoints of Dental Pathology

*Abstracted from volumes by WESTON A. PRICE, on
"Dental Infections, Oral and Systemic" and "Dental Infections
and the Degenerative Diseases."*

IN the consideration of dental focal infections in the past, much emphasis has been put on the biological strain of organism which has chanced to get access to that focus. The extent and nature of the local and systemic reactions have been looked upon as largely functions of that invading organism. The author submits evidence for consideration, which suggests to him that the organisms which are chiefly involved in dental infections: namely, streptococci, obtain their elective localization qualities, when such exist, very largely from the host, which furnishes to them their nutriment and environment, and that they do this largely through their wonderful capacity for adaptation.

(b) With regard to root end infections, the current and general conception seems to be that the extent of an area of absorption about the apex of an infected tooth root, when such exists, is directly a measure of the quantity of that infection, and therefore a measure of the danger. The author believes this to be a misapprehension and misinterpretation. The new data indicate to him that it does

not represent the activity of the invading organism, but does express the reactivity of the invaded host to that foreign irritant, the invading organism.

(c) The presumption in current dental diagnosis seems, in general, to be that potentially equivalent, infected teeth will, in different individuals, be attended by similar local expressions about those infected teeth. The data developed in his researches indicate to him that potentially equivalent, infected teeth will, in different individuals, be attended by very different types of local structural changes in the supporting tissues.

(d) It is currently understood, he believes, that the safety of the host is inversely proportional to the evidence of reaction about infected teeth. For example, it is presumed that those teeth with large areas of rarefaction about their apices indicate that those patients are potentially in danger, because of a large amount of infection, and those with little or no evidence of reaction about the teeth are in relatively little danger. The data which he presents to you clearly indicate to him that with a given dental infection the safety of the host is directly proportional to his capacity for local reaction; and, conversely, his danger is in direct proportion to his lack of capacity to make a local reaction. With a given infected tooth, therefore, a vigorous local reaction means, incidentally, a liberal destruction of bone for the development of an effective defensive quarantine tissue immediately about the source of that infection. He believes that it is at the time that this quarantine tissue ceases to function and breaks down, that the host comes to be in danger, for now the warfare, which up to this time has been waged to a finish immediately about the infected tooth, must be waged in other structures of the body, and that tissue tends to break first, which is most weakened by overload or handicapped by lack of inherited defensive forces.

(e) It may be that with this given infected tooth, the patient may be one who never established an adequate local quarantine, and he never was safe, and therefore never established a zone of rarefaction about the tooth or, if any, a very slight and inadequate one. The factor of safety of this type of person is being grossly misjudged, and often those individuals most needing rescue are mistakenly dismissed as having no source of serious focal infection.

(f) The data, which he presents to you, reveal to him that those individuals who develop the large apical areas because of their good capacity for reaction to an irritant, prove to be the ones who tend to develop periodontoclasia, or so-called pyorrhea alveolaris. They seldom have rheumatic group lesions. That this is not merely a coincidence, but a fundamental law of a defensive reaction, is clearly established in the accompanying data.

(g) Decalcification and calcification processes, as reactions to irritants, have direct significance because they are a fundamental part of the defensive reactions.

(h) The various expressions of different types of reaction, local and systemic, are directly related to fundamental factors of blood chemistry, blood morphology, and blood bactericidal property, for certain types of organisms, chiefly the strains of streptococci and diplococci.

(i) The decreased defensive forces of the blood can often be enhanced, and in some cases, very greatly so.

(j) A long-continued, or chronic, dental infection, which may have given no suggestions of tenderness, may (because of the absence of a local warfare and defensive fight) cause the breakdown of certain organs or tissues of the body, though it may take months or years to do it, during which time the tooth involved may never even be suspected.

(k) Thus, very many of the degenerative, or so-called old age, diseases, may have as their contributing, or as their principal causative factor, such an obscure dental focal infection, with or without local or systemic contributing overloads. These degenerative processes may include various types of eye involvements, including blindness, heart involvements of many types, several types of kidney disease, mild and grave nervous system and brain diseases, many digestive tract diseases, ovarian cysts, a large percentage of the cases of arthritis, many types of skin lesions, several of the allergic disturbances, etc., etc. He believes that he has demonstrated that almost any structure of the body may be involved and many pathological states, which have not been considered to have even a remote relation to focal infection, are now demonstrated to be influenced by them.

Before taking up the detailed study of this problem, he discusses one of the most important of the methods used for making the diagnosis of dental infections—namely, the use of the Roentgen-rays. He assumes that it is currently believed that the actual conditions about teeth are largely as they appear to be in the roentgenograms. That this is not true he believes to be one of the greatest misfortunes which could possibly exist in relation to dental infections, since in them we are dealing with pathological states within vital structures, and therefore beyond the possibility of direct examination. The roentgenogram has been spoken of as the living postmortem. The author states that we would not presume to photograph a dog behind a tree for most obvious reasons, yet we do presume to make roentgenograms of the various structures, such as roots of teeth behind other roots, or behind such dense bones as the malar bone, and of rarefied areas behind zones of condensed structure, without the information that would make possible the correction necessary for the intervening

obstruction. This is abundantly demonstrated by illustrations comparing the roentgenogram with the actual photographic appearance of various conditions that we are called upon to interpret and differentiate.

The above sketch suggests the line of discussion in the first five chapters; the other thirty-nine take up similarly various involved factors. The interpretations of these forty-four chapters are given in nine chapters, 45 to 56, and the general summary is presented in Chapter 57 of Volume I. Volume II presents the application of these principles to a large number of cases in which the various lesions are grouped for consecutive consideration.

Dentistry After the War

BY EDWARD C. KIRK, D.D.S., Sc.D., LL.D.

Although five years have passed since the final gun was fired on the Flanders front, return to a normal state physically, economically or morally is still far from fulfilment. The fact is that certain unhealthy practices, bred by post-war rather than by war conditions, have increased to an alarming extent in the past three years.

Dr. Edward C. Kirk, a man endowed with exceptionally keen powers of observation and with enough years of broad experience to make his observations of practical value, having spent several months last summer in England and on the continent, has contributed the following paper on the post-war status of dental practice.

Dr. Kirk's views have direct bearing on conditions in every country in which dentistry is practised, and should be of keen interest to all who have the progress and advancement of the science at heart.

IT is a trite saying that science knows no geographical boundaries, that knowledge is the common heritage of humanity.

Because each nation contributes its quota to the general stock of knowledge the impulses that make for progress are not a monopoly of any nation or people.

Whatever differences may determine national characteristics, the results of the pursuit of knowledge when expressed as scientific attainment are a cosmopolitan asset.

A clear distinction must, however, be made between the attainment of knowledge and its practical application to human needs, for herein lie the differences characteristic of different national activities.

The evolution of modern dental art, both in Europe and America, has its foundations in the common stock of scientific knowledge from which all rational dental practice springs, but dental art in each

country has evolved under the influence of certain formative conditions inherent in the local national environment, and hence has developed characteristic differences in its practical expressions.

While differences in the applications of dental science to dental practice must always exist in view of the personal factor involved, and, further, because of the compelling requirements imposed by the adaptation of dental practice to local public demands, it is nevertheless illogical and unscientific that there should be fundamental differences in principle between the art of dentistry as practised in one country when compared with that of another, or of one locality in a nation as compared with that of another locality in the same nation. From the point of view of its public service relations the wide-spread heterogeneous character of dental practice has long been recognized as an obstacle to dental progress. A humanitarian service, such as it is the aim of dentistry to render, cannot in the nature of the case achieve its highest purpose when performed in a disorganized or haphazard fashion.

Studies made during frequent visits to Europe extending over the past thirty years have impressed the writer with the belief that the need for a concert of action looking toward the unification of standards in dental practice is a vital requirement if the best results expressed in terms of the public welfare are to be broadly attained. It was the practical recognition of the necessity for some plan of harmonization of ideas and methods in dentistry that led the International Dental Congress at Paris, in 1900, to organize the Federation Dentaire Internationale, one of the important functions of which was to recommend to the dental educational bodies of all nations a standard curriculum of professional education.

In addition to its educational work it was likewise charged with the duty of recommending unification of the legislative restrictions governing the practice of dentistry and further to promote upon a unified basis of procedure public oral hygiene service in the several nations of its constituent membership. In short, the central purpose of the F. D. I. is to bring harmony and order out of the chaotic and heterogeneous adaptations of dental science as expressed in the world's dental art and practice.

During the fourteen years of its activity previous to the advent of the world war much progress was made by the F. D. I. in the unification of dental standards in the educational and legislative fields, but the setback of all the factors of civilization caused by the war not only dislocated the activities of the F. D. I., but has confronted it, as well as the whole dental profession, with new problems arising out of the demoralization and disorganization of all human activities which has resulted from the war. An appalling and vivid picture of the extreme demoralization and practical disintegration

that the war has wrought upon a large body of the dental profession has been made public in the report of Dr. Florestan Aguilar, commissioned by the F. D. I. to make a survey and report upon the conditions of dentistry and dental practitioners in Russia, a situation that will necessitate the re-creation of the Russian dental profession from its foundations, as only the phrase "totally destroyed" can adequately express its present status.

In varying though infinitely less degrees, the whole dental profession of Europe has been more or less seriously affected by the world calamity in ways that strike at the very roots of dental progress in an intellectual as well as in a material sense.

The process of recuperation is actively going on, the F. D. I. has succeeded in effecting a reorganization of its activities, the dental societies of Europe are once more hopefully functioning, so that the benefits of professional intercourse, with all that is implied therein of scientific advancement and harmonization of methods and purposes, are once more made available.

We of the American dental profession owe much to our European colleagues for the light which their scientific researches has thrown upon many of the complex problems that have perplexed us and which, particularly in the realm of pathology, have balked our efforts at successful therapeutic treatment for the lack of knowledge as to underlying principles. We are still further under obligation to many of our European confreres for the example they afford us of patient systematic study and research conducted unselfishly and without prospect or hope of reward other than the personal satisfaction of having solved an important problem—in short, for their spirit of scientific inquiry from the results of which all derive a direct benefit.

On the other hand, America has contributed largely in the past to the advancement of dental art by the introduction of methods and devices that have facilitated the performance of various dental operations, and furthermore have made possible operations that were otherwise impossible. Thus the scientific trend of European dental thought has been counterbalanced, as it were, by a certain flexibility of mental resourcefulness expressed in the contributions of the dental profession of the new world and both have been essential factors in the progress of dentistry as a whole.

It is self-evident that these two elemental factors of dental advancement should be nourished and stimulated into co-operative functional activity in order to contribute effectively toward dental progress.

There is another and equally important factor which bears directly upon the successful functioning of the two already referred to, viz., the co-ordination of the dental armamentarium with the entire series of procedures that the dentist is called upon to perform.

It is but little understood in America, and in Europe scarcely at all, that in the evolutionary process by which the science of dental procedure is adapted to and expressed in the performance of dental operations there has always gone on *pari passu* a corresponding evolution in the processes of manufacture of the multitudinous supplies required by the dentist in his professional work. A vast army of skilled operatives, guided by the researches of a corps of mechanical and chemical engineers, in connection with the advice of experienced dental practitioners, constitute a factor in dental progress that, by keeping in close touch with the advance guard, is continually working out adaptations of the dental tools, appliances, materials and equipment required by the dental operator in order that he may give material expression to the highest refinements of his art.

If the problem be that of cavity preparation, the treatment of pyorrhea alveolaris, root canal treatment, the extraction of teeth or whatever it may be, and a new system of instrumentation or a refinement of treatment or method of procedure is suggested in relation thereto, the producer of dental supplies is confronted with a new and oftentimes intricate problem. It is not often merely the changing of the shape of an instrument or the production of a new one: it may involve a long chemical and mechanical research into the physical properties of a material and the adaptation of that material physically, mechanically, and chemically, to the purpose for which it is intended. In short, the production of supplies adapted to the needs of the dentist who has an adequate conception of the requirements of his calling demands of the manufacturer as high ideals, as thorough a scientific equipment, and as firm a determination to achieve only the highest possible attainment in the results of his activities as are characteristic of the truly professional man.

It is only these elements of character that in a co-operative way contribute to real dental progress, and it is a falling off in this latter respect that impresses one in a survey of European conditions as an outstanding feature of the havoc wrought by the war.

Europe is flooded with a mass of dental supplies that cannot fail to degrade, has already degraded, in fact, the standards of operative procedure achieved before the war. Much of this material originates in central Europe, where the need for money has cheapened product with a corresponding disregard of quality and of adaptation to specific uses. To the superficial or casual observer a strictly high grade product and its cheap imitation may look quite alike, indeed, it is the intention of the producer of inferior products that they shall look the same as the standard goods. A razor of low grade steel may have the same polish, original keenness of edge and general appearance of a high grade razor, but for the purposes of shaving it is worse than useless. The flooding of the markets with worthless imitations

of standard products for sale at low prices, and dear at any price, is characteristic of the post-war period.

Regrettable as the situation may be in a general way, its effect upon dental standards is calamitous.

The work of the dentist is directly concerned with the public welfare in its most important aspect, that of bodily health. The character of his work is in large degree determined by the standard and quality of his armamentarium. High grade operations in dentistry are impossible with low grade instruments, and the patient is by no means the only sufferer from inferior work so done. The greatest harm in such a case inures to the dentist himself, not possibly in loss of income, as occasionally, and for a time, as has been said, "the wicked flourish as a green bay tree," but what certainly does follow the habitual use of low grade instruments and materials in dental practice is the ultimate demoralization of the dentist who succumbs to the lure of cheapness instead of standard quality in anything that he uses, in anything that he does.

A careful study of the situation while in Europe during the past summer has forced upon the writer the firm belief that it is the subtle, seductive invasion of dental practice by the persuasiveness of cheapness and masked inferiority of dental products that, more particularly in Europe, is to-day demoralizing standards and lowering the grade of professional practice in this post-war period.

Not until there is a general awakening to the fact that the best service can only be attained by the use of the best standard quality of professional armamentarium and that the best service brings the best rewards, will the standards of dentistry return to pre-war levels.

The art of dentistry is an art rooted in science and only as it draws its sustenance from the sources of scientific research can its growth be vigorous and wholesome, but its material expressions in the handicraft of those who practise it must also embody the quality that gives life and beauty to all truly artistic creations, that expresses the inspiration and belief of the artist that

"Blessed is he who has been apprenticed to a craft and taught to preach beauty with his hands."

Notice of Removal

DR. C. ANGUS KENNEDY, Orthodontist, has announced the removal of his office to the Physicians and Surgeons Building, 86 Bloor St. West, Toronto.

Dr. Henry G. Robb, Exodontist, has also announced the removal of his office to the Physicians and Surgeons Building.

Canadian Dental Association Meeting— Vancouver, August, 1924

SEE CANADA FIRST.

THE meeting of the Canadian Dental Association this year is to be held in Vancouver, August 4th to 7th. The committee is lining up a very good programme, and has the promise of some very fine essayists.

The Entertainment Committee is making special efforts to provide Eastern Dentists with an entertainment ever to be remembered. Beautiful drives and wonderful scenery near Vancouver are numerous, and the committee is working to make this convention a very memorable one. When the boys from the West put on an entertainment, they do not stop short of the best.

This visit to the Pacific Coast was planned by the Executive committee of the C.D.A., who felt that the objects for which the



Mount Edith Cavell.

C.D.A. stands would be furthered by such a visit to other parts of the Dominion.

It is felt that such a trip, made at the best season of the year and during harvest time in the West, should prove a great stimulus to our interest in, and appreciation of, the vastness and resources of our great country.

It is the duty of the professional man to see and become acquainted with his own country. The trip to the coast this year, with the stop-over privileges obtained from the railways at all the points of interest, and in the company of your colleagues, should make the excursion one of intense interest.

The Transportation Committee has made extensive enquiries concerning the different routes and fares, and a comprehensive report is given below. The stop-over privileges obtained will allow members to stop wherever desired, and for any desired time.

- Tour No. 1.**—All rail both ways—C.P.R.—Fare and lower berth, \$166.60.
- Tour No. 2.**—Toronto—Lake one way—Calgary, Banff, Lake Louise, Okanagan Valley, Victoria; Return—Revelstoke, Kootenay, Medicine Hat, Winnipeg, Toronto.—C.P.R.—Fare and lower berth, \$169.95.
- Tour No. 3.**—Toronto—Lake one way—Calgary, Banff, Lake Louise, Victoria, Seattle, Portland, Vancouver, Winnipeg, Toronto—C.P.R.—Fare and lower berth, \$171.95.
- Tour No. 4.**—Lake—Calgary, Banff, Lake Louise, Sicamous, Vancouver; Return via St. Paul and Chicago, Toronto.—Fare and lower berth, \$166.11.
- Tour No. 5.**—Lake—Calgary, Banff, Lake Louise, Sicamous, Okanagan Valley, Victoria.—C.P.R. Return, via C.N.R.—Prince Rupert, Jasper Park, Edmonton, Saskatoon, Winnipeg, Toronto. Fare and lower berth, \$191.05.
- Tour No. 6.**—Lake—Banff, Revelstoke, Arrowhead, Robson West, Penticton, Okanagan Valley, Victoria, Portland, San Francisco, Los Angeles, Salt Lake, Denver, Chicago, Toronto.—C.P.R. Fare and lower berth, \$236.27.
- Tour No. 7.**—Lake—Winnipeg, Saskatoon, Edmonton, Jasper Park, Prince Rupert, Vancouver. Return—via Jasper Park, Edmonton, Calgary, Saskatoon, Regina, Winnipeg, Cochrane, Toronto—C.N.R. Fare and lower berth, \$180.90.
- Tour No. 8.**—Toronto, Sudbury, Port Arthur, Winnipeg, Saskatoon, Edmonton, Jasper Park, Prince Rupert, Vancouver, Victoria, Portland. Return—via Omaha, Chicago, Toronto, or via Portland, St. Paul, Chicago, Toronto.—C.N.R. Fare and Lower berth, \$193.81.



Jasper Park Lodge.

Tour No. 9.—Going, C.N.R., same as Tour No. 8. Returning—via San Francisco, Los Angeles, El Paso, New Orleans, Atlanta, Ga., Washington, New York, Toronto. Fare and lower berth, \$231.60.

This route entitles passenger to use of steamer between New Orleans and New York on payment of meals and berth charges.

All the above routes provide side trips which can be taken if time and expense are available.

Correspondingly low fares (not including berths) will be made from points East of Toronto under the same conditions as those applying from Toronto.

From principal points approximately as follows:—

Halifax	\$170.45
St. John	165.10
Fredericton	163.60
Quebec	144.10
Montreal	133.85
Ottawa	128.05

All of above fares good via Toronto.

SIDE TRIPS.

Many interesting side-trips are available. Among them is a motor trip of about 190 miles through the mountains and lake scenery to Seattle; also one to the North end of Vancouver Island through the lumbering and mining districts.

ALASKA.

Side-trip may be made from Vancouver to Skagway, Alaska, via C.P.S.S., at fare of approximately \$80.00 (including meals and berth). This is a ten-day trip, allowing two full days in Skagway (meals not included while laying in port), and may be extended from Skagway to Lake Atlin and return for \$50.00 additional, which includes a sidetrip from Carcross to White Horse, or from Skagway to Dawson and return at \$115.00 additional, including meals and berth on Lake and River steamers.

Lake Atlin requires one week's time from Skagway, and Dawson and return requires two weeks additional.



Amethyst Lake Camp.

Any member wishing to avail themselves of the Alaska trip should communicate with the Transportation Committee as early as possible to insure accommodation, which is usually overcrowded.

All tickets will read Vancouver—Victoria—Seattle and Portland, as final destinations without any extra fare.

All Great Lake trips are \$10.00 extra, including meals and berths, above all rail routes.

The steamer trip between Prince Rupert and Vancouver is \$13.00 extra, including meals and berth, above all rail routes.

COMMITTEE.

W. B. AMY,

C. ANGUS KENNEDY,

Chairman

Death of One of Canada's Oldest Dentists

DR. THOMAS JOSEPH JONES, said to be the oldest dental practitioner in Canada, died in Victoria, B.C., on January 22, 1924, aged 79. He commenced the practice of dentistry over sixty years ago, in Toronto. A lifelong Liberal, the late Dr. Jones has often been called the father of Liberalism in the Province of British Columbia.

Dental Cars

SASKATCHEWAN'S JUNIOR RED CROSS SUPPORT A HIGHLY VALUED AND SUCCESSFUL HEALTH ENTERPRISE.

DESPITE adverse weather conditions the dental cars operated by the Junior Red Cross of the Saskatchewan Division visited 112 rural schools during the past summer. The dentists in charge lectured on oral (mouth) hygiene to 3,007 pupils.

The number of children who received dental treatment was 1,136. The attention they received, as classified by the dentists, was as follows: Fillings, 669; extractions, 1,410; prophylaxis (preservative or preventive treatment for disease), 108.

This enterprising Junior Red Cross Service is conferring lasting benefit upon the lives of the many who receive its kindly attentions, and is impressing upon thousands of children of the province the great importance of the care of the mouth and teeth.

MULTUM IN PARVO

This Department is Edited by
C. A. KENNEDY, D.D.S., 86 Bloor St. W., Toronto

HELPFUL PRACTICAL SUGGESTIONS FOR PUBLICATION, SENT IN BY MEMBERS OF THE PROFESSION, WILL BE APPRECIATED BY THIS DEPARTMENT

TO REPAIR HOLE IN RUBBER DAM.—Saturate a pledget of cotton with shellac and insert this plug in the hole. Wait a few minutes while the shellac hardens, then wipe away any saliva that may have come through the hole and proceed with the work.—(K. C. A.)

LIME WATER.—A little lime placed in a bottle of water will provide a mouth wash which is an excellent deodorizer for both dentist and patient. The lime may be allowed to settle and the water poured off in small quantities as required and diluted. More water may be added until the lime has all gone. Plaster mixed with lime water makes a harder model than when water is used.—(Mr. H. J. Morris, Sheffield, England.—*The Dental Record*.)

PRECEDENT.—One of the most difficult things for an individual or a profession to overcome and change, even though it may be wrong, is precedent, or an established custom or method of practice which has been in vogue for years, and more particularly is this true if the method or custom has been given prominence in the literature. No matter how great a fallacy it may be proved, years after it has been discarded by the masses, you will find those who are still clinging to a practice of bygone days, apparently opposed to any innovation or progressive step.—(J. V. Mershon, D.D.S.)

PUNCTUALITY.—Dentists who are punctual in their appointments will invariably find a ready response from their patients. How much better to have patients arrive on time, or a few minutes before, than for them to keep you waiting. The office where the obligation to meet an appointment punctually is habitually neglected cannot be considered to have attained a very high degree of efficiency. The unused time of broken appointments should always be charged for, unless due notice has been given. So also should time lost through tardiness. Only in this way may we train ourselves and our patients to be punctual. This should be an inflexible rule.—(A. Walker, D.D.S., *Dental Science Journal*.)

THE COMPENDIUM

This Department is Edited by
THOMAS COWLING, B.A., D.D.S., Toronto

A SYNOPSIS OF CURRENT LITERATURE RELATING
TO THE SCIENCE AND PRACTICE OF DENTISTRY

EASING THE DENTURE.

THE Dental Record, August, 1923, gives an account of a paper published by M. M. Pouray and Mozer in the "Revue de Stomatologie," in which a method is described whereby a denture may be eased at that point which causes excoriation. It is a difficult thing to locate such a point with precision simply by looking in the mouth and then estimating the corresponding area on the denture. It is best to mark the spot definitely. This method is followed by metal adjusters, who use a piece of ochre, or rouge, or even vermilion for marking surfaces to be ground down. Why not do the same thing with dentures and other dental appliances? All we need is some soluble colouring matter which will form, on contact with the moist tissues, a kind of copying ink. In the ordinary ink pencil we have both methylene blue and aniline. The former has the advantage of being a therapeutic agent, a very useful one for treating buccal ulcers. With such a pencil a line is marked about the ulcerated area and the appliance put to place. The marking will be reproduced on the appliance and it is ground until the ink pencil mark ceases to produce stains on its surface. When dealing with cases in the upper jaw it is best to moisten the pencil because sometimes the mucous provides insufficient moisture.

THE OVERTRAINED DENTAL ASSISTANT.

IN a recent editorial in the "International Journal of Orthodontia" attention is directed to a complaint voiced by medical men as expressed in an article entitled "The Overtrained Nurse" and published in "The New York Medical Weekly." In this article the complaint is made that the trend in training nurses is away from practical experience and towards elaborate theoretical training, which instead of developing a more efficient type of nurse has developed "an anomalous theorist who is neither doctor nor nurse and yet, in many cases, feels herself equal to the prerogatives of both."

To show how real a menace to proficiency such a course may become and to show how deep-rooted the "theorist fad" may become, a further quotation from "The Medical Weekly" is given:

"New Yale University, with the financial aid of the Rockefeller Foundation, announces that it will establish an undergraduate school of nursing with a course that will eliminate the unpleasant routine tasks of the apprenticeship plan hitherto in operation (and dependent upon medical schools and colleges) and will give instead a theoretical education in the factors contributing towards diagnosis, care and treatment of disease."

In the training of dental and medical assistants the over-emphasis placed upon theory and diagnosis at the expense of practical training may prove to be a dangerous thing on account of the assumption of knowledge not really possessed.

A dental college that undertakes to educate an already capable and practical worker and graduates same as an impractical theorist determined to keep all unpleasant tasks at a respectful distance, has failed utterly in its task and had better cease operations before doing more harm.

CARIES.

THE question of prevention occupies a foremost place in both the medical and dental professions. This is the day of prevention, particularly in dentistry. A larger proportion of our literature is devoted to this subject than to any other. For students of this problem there has been much of interest and profit in a series of articles by J. Sim Wallace, M.D., D.Sc., L.D.S., published in the *British Journal of Dental Science*, entitled "Observations on the Progress of Preventive Dentistry." These publications are of great interest, because they represent at once the personal views of a prominent and skilful investigator, and those endorsed by a large portion of the dental profession in England.

The complete publications, although extensive, are full of real information, and will well repay those who study them. The concluding summary only is given here. It deals with the causation of caries:

"Caries is a chemico-parasitical process, primarily involving the fermentation of carbohydrates. What determines the production of caries (that is, the cause of caries) is unduly prolonged lodgment of carbohydrates under conditions favorable to the production and accumulation of acid in sufficient strength to destroy the enamel. (Carbohydrates which do not lodge or ferment, or cause other carbohydrates to lodge unduly, do not cause caries.) Besides the bacteria which produce acid, others generally take a share in the process. For example, the bacteria which convert the disaccharides into mono-

saccharides, and those which cause manitic fermentation. The exciting cause (acid-forming bacteria) is primarily outside of, and altogether independent of, the histological structure of the tooth. There are several predisposing causes, but these may be summarized by saying that they are all those conditions which favor the location and action of the exciting cause. For example, crevices, normal and abnormal pits, irregularities of the teeth, receding gums, bad dietetic habits, and faulty response of the physiological self-cleansing processes of the mouth. To these must be added the quality of the food which lodges (fermentability, impermeability, and viscosity), as this is the soil which attracts and encourages the proliferation of the acid-forming bacteria, and, moreover, may impede the protective and self-cleansing physiological processes which keep the teeth free from decay. These predisposing causes are all external to, and independent of, the histological characteristics of the teeth. Altogether, we may say in two words that the cause of caries is carbohydrate stasis."

PHOSPHORUS.

ABOUT thirty years ago, necrosis of the jaw, resulting from this poison, was rather common amongst workers in match factories. It is the yellow phosphorus which causes the trouble, and the condition usually occurs with those who have been exposed to the fumes for a long time, and whose mouths are unhealthy. The sequestrum is characteristic, and is seen to be coated with a dirty grey deposit, like pumice-stone in appearance. Amorphous phosphorus is harmless.

The mandible is more susceptible to necrosis than the maxilla, because of its exposure to injury, its larger proportion of compact bone, the relatively small supply of blood, and, perhaps chiefly, because of the difficulty of drainage when infection of the sockets occurs. These conditions also explain why many cases of necrosis of the mandible are so extensive, for the living bone nearest the dead bone has to fight for its life, as well as to work to cast off sequestrum, which becomes merely a foreign body. This dead bone, or sequestrum, is hard, rough, porous, light, and dull to the tap of a metal instrument. At first it is white, but later becomes discolored on exposure to the air or to decomposition.

In the capacity for repair after necrosis, there is considerable difference between the maxilla and the mandible, the former being slight, whereas, in the case of the mandible, the periosteum is very active in aiding the production of new bone, to take the place of that which has been lost by necrosis. The new bone is called the "involucrum," because it forms a sheath around the sequestrum, and it is pierced by a number of holes, called "cloacal," which allow the pus around the dead bone to escape on to the surface.

The treatment of necrosis of the jaw involves, first, the removal

of the cause, where it is possible to do so, and then to use the special remedies indicated for specific cases. Then make free incisions down to the bone, preferably within the mouth, but if the lower border of the jaw is involved, an external incision would be more effectual. There may be danger in attempting to save the skin, especially in those cases where the sequestrum includes a portion of the bone below the apices of the teeth. There must be no hesitation in extracting loose and septic teeth, and it is best to postpone the operation of removal of dead bone until the sequestrum is quite separated. Meddlesome treatment aggravates the inflammatory process and often causes an extension of the trouble beyond the limits previously involved, and also arrests the formative periostitis which leads to the rebuilding of the bone. When the bone has commenced to sequestrate, the use of 5 per cent. lactic acid may help to hasten the separation.

MERCURY.

Mercury necrosis is comparatively rare. At one time salivation was considered a necessary part of the treatment of syphilis with mercury, and quite often mercurial necrosis followed. Many workers in the plants manufacturing mirrors became victims of this material. Mirrors were made by sliding and compressing glass plates on to sheets covered with mercury; but this method has been replaced by chemical processes.

NECROSIS OF THE JAW.

IN a recent edition of *Guy's Hospital Gazette* there is published a very interesting account of necrosis of the jaw, given by J. Lewin Payne, O.B.E., M.R.C.S., L.D.S., The distinguished essayist points out that there are two main causes of this disease; namely, cases arising from (1) bacterial infection, and (2) chemical poisons. At the present time bacterial infection is the more important cause, including, as it does, cases arising after trauma, exanthematous necrosis; and those due to specific infection from such diseases as syphilis, tubercle and actinomycosis.

Arsenic, mercury and phosphorus are the chief poisons associated with necrosis of the jaw.

When necrosis is due to traumatism, it results commonly in connection with comminuted fractures of the jaw. Infection of the fractured surfaces easily occurs from the mouth, especially when the teeth are septic.

Infection, by pyogenic organism, may be brought about by a dirty condition of the teeth, resulting in periodontitis, alveolar abscess, and necrosis; also from the gum, as in cases of simple stomatitis, gangrenous stomatitis, cancrumoris, and scurvy. And sometimes necrosis

may arise as the result of sepsis of an impacted tooth, or from a socket after extraction.

In these cases, infection may come via the blood stream, or may follow the injection of local anesthetics into inflamed tissues.

Specific infection is most commonly due to syphilis, through lesions associated with the tertiary stage of the disease, which affects the maxillae more frequently than the mandible.

ACTINOMYCOSIS.

Actinomycosis of the jaw is the result of infections from an organism of the streptothrix group, and is rare in man, but common in cattle, when it is said to be due to the eating of barley in which the ray fungus is present. This fungus may find its way through a cavity in a tooth, or directly into the soft tissues, when an abscess develops around each nodule, and necrosis may follow.

A malignant growth in the jaw may also be the cause of necrosis.

ARSENIC.

Necrosis of the jaw may arise from arsenious acid, used by dentists to devitalize the tooth pulp. Some of the drug may escape on to the gums, or may find its way through the apical foramen. Usually, only local necrosis results, but sometimes the condition becomes quite extensive. Extreme care should be exercised when sealing arsenic treatments in a tooth cavity, and only the minimum amount of the drug should be used.

R.C.D.S. Announcements Wanted

A SUBSCRIBER has written ORAL HEALTH that he will be glad to pay for copies of Announcement and Report of the Annual Meetings of the Royal College of Dental Surgeons, covering the following years: Sessions, 1897-1898, 1898-1899, 1900-1901, 1901-1902.

Generous Gift to Northwestern University

MRS. MONTGOMERY WARD recently announced a gift of three million dollars to Northwestern University for the erection of a Montgomery Ward Memorial Building, to provide quarters for both the Dental and Medical Schools. One-half of the building will be occupied by the Dental School.

Dean Black and the Dental Faculty of Northwestern are to be congratulated upon this magnificent gift for the furtherance of medical and dental education at Northwestern University.



BRITISH COLUMBIA—A. T. OBERG, D.D.S.

825 Granville St., Vancouver

ALBERTA—JOHN W. CLAY, D.D.S.

914 Herald Bldg., Calgary

SASKATCHEWAN—C. W. PARKER, D.D.S.

Imperial Bank Bldg., Regina

MARITIME PROVINCES—STANLEY BAGNALL, D.D.S., Commodore Apts., Halifax, N.S.

MANITOBA—W. W. WRIGHT, D.D.S.

767 Warsaw Ave., Winnipeg

ONTARIO—Lieut.-Col. W. G. THOMPSON

28 King St. West, Hamilton

QUEBEC—ARCHIE N. JENKS, D.D.S.

121 Bishop St., Montreal, Que.

ONTARIO.

THE London Dental Society is in a very gratifying condition, with forty members this year, and all of the meetings well attended. The first meeting of the season was on October 31st, when a joint session was held with the Western Ontario Academy of Medicine and the Elgin (St. Thomas) Dental Society. Dr. Weston A. Price, of Cleveland, was the principal speaker. He gave a comprehensive and very able address on the most recent investigations regarding focal infection of dental origin. The address was acknowledged by the president of the Academy of Medicine to be the most masterly to which that organization had had the privilege of listening. Dr. Price was followed by a paper by Dr. Wright, of Toronto, and by a short address by Dr. Banting. This meeting was held in the assembly room of the new medical school.

On November 30th and December 1st, Dr. I. H. Ante gave a splendid clinic on gold inlay and inlay bridge-work. This clinic was held in a classroom of the Technical School.

The January meeting consisted of a dinner, followed by an excellent paper and clinic by Dr. Harold S. Slocum, of Detroit, on "Root Canal Problems and Treatment Tending Toward Conservation."

Further clinics will be conducted each month until spring.

In addition to these sessions, the Association has a class of seventeen taking anatomy one evening a week, at the Western University Medical School, under the direction of one of the college staff.

The Executive Committee of the London Dental Society for this year consists of: President, John F. Blair; Vice-President, M. A. Ross Thomas; Secretary-Treasurer, W. Y. Hayden; Executive, S. M. Kennedy.—W. Y. H.

There has hitherto been not so much a sharp line of distinction between dentistry and medical practice, as the entire absence of relationship between the two.—(J. B. Deaner, M.D.)



THE MIRAGE.

WHAT is more fascinating than the mirage, and what more misleading? Surely the sky is "holding the mirror up to Nature," and we are invariably more interested in looking at the mirror than we are in looking at Nature herself. It is so in many of the affairs of life—we are attracted by the unreal, and overlook the real lying at our very feet. We strain at appearance and forget behavior. We judge men by outward show, and ignore the heart of gold within. "Putting up a good front" has become a byword in the land, and it is illustrative of a prevalent tendency of the hour.

"How was she dressed?" is a more frequent question than "What did she say?" or "How did she act?" We think more of clothing than we do of character—more of the color of the paint than of the quality of the timber within. We are carried away with the gloss and forget the grain; with the form, and forget the fibre. We are constantly watching the mirage.

We chase the bauble reputation, instead of striving for the sublimity of service. We are more concerned with what people think about us than with what we think about ourselves. The real things of life, the genuine things, the simple things, the essential things—these we pass by in apparent disregard, and reach out for the ephemeral and the fleeting. All along the way of life we are attracted by the flamboyant and the flimsy—by the superficial, rather than by the substance. Apparently we care less for stability than we do for splendor—less for the kernel than for the shell.

Let us take stock of our point of view, and see if we cannot revise it. Let us seek for a better perspective, so that we may get a clearer vision into the heart of things. Let us take our eyes off the mirage, and train them upon the tangible. Let us look away from the image long enough to analyze the object.

We waste much energy chasing the rainbow. It takes us a long time to learn that the glitter at the end of it is not gold—to know

that the alluring shades contain no substance. We fritter away our resources on the non-essentials of life, and then we wonder why we do not sooner come into the kingdom of achievement.

All life, of course, should not be reduced to the hard level of material things. The fanciful, the poetic, the imaginary, must be admitted at times to act as a sweet savor and point us to the higher ideals. Man cannot live "by meat alone"—he must have woven into his make-up some of the finer threads of gossamer, which give it airiness and lightness. But he should not look upon the gossamer as constituting the real fabric of his existence.

To be a well-rounded man—to keep the eye on the actualities of life, and the feet firmly on the ground, to face things as they are, to cope with conditions when they arise and not hide the head in the sand—to do all of this and at the same time to admit the sunlight of sentiment into the heart, to turn aside now and then, to laugh and play, to reach out and take a fellow human being by the hand—this is life at its fullest and best.

The mirage will never bring us sustenance either of body or of mind. It is a delusion and a dream—the essence of life lies lower down.

C. H. Johnson

The Ontario Dental Convention

AN AUTHORITATIVE REPORT ON DENTISTRY AS IT IS TAUGHT
AND PRACTISED TO-DAY.

THOMAS COWLING, B.A., L.D.S., D.D.S., Professor in the Royal College of Dental Surgeons, has undertaken to compile and present this report at the 1924 Convention of the Ontario Dental Society.

This is an important subject, and Dr. Cowling, as editor of the "Compendium" in ORAL HEALTH, is specially equipped to deal with this broad question.

Every department of dental practice will receive definite attention. Specialists in these departments will be consulted, and so Dr. Cowling will be able to place before the convention just what has been decided upon as trustworthy and of practical value in each department of practice.

If you are in doubt as to any of your methods, hear this paper by Dr. Cowling. It will help you clear up your difficulties.

R. G. McL.

ORAL HEALTH

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Vol. 14

TORONTO, FEBRUARY, 1924

No. 2

EDITORIAL

The Canadian Dental Hygiene Council

A NATIONAL COUNCIL, to be known as "The Canadian Dental Hygiene Council, is being organized, with the following objects:

1. To undertake such measures as may be necessary to prevent, reduce or assist in the control of dental disease, thus establishing a higher standard of public health.

2. To carry on by means of lectures, demonstrations, exhibits, bulletins, the press, and all other proper channels, a public educational campaign concerning the teeth and their care, oral hygiene and the relation between dental disease and systemic disorders.

3. To further the organization of public dental clinics, particularly in schools, hospitals, and outlying districts where regular dental service is not available to the people.

4. To enlist the co-operation of the general public and thus increase general interest in the improvement of mouth conditions.

His Excellency, General the Right Honorable Lord Byng of Vimy, G.C.B., G.C.M.G., M.V.O., has graciously consented to act as Patron, and the Lieutenant-Governors of each of the Provinces of Canada have been invited to act as honorary Patrons.

The Honorable Sidney Mewburn has accepted the Presidency of the Council, and has suggested that the Minister of Health in the Federal Cabinet be asked to act as Honorary President, and the Ministers of Health in the various Provinces of Canada as Honorary Vice-Presidents.

The Canadian Dental Hygiene Council is to be national in scope, and will seek funds through Governmental channels, commercial bodies, and private subscriptions. Dentists will have the same privilege of subscribing funds as others, and in no case will a donation of any kind carry with it an obligation to recommend or support any particular product.

The Council has decided to ask the Canadian Dental Research Foundation to report upon dental toilet articles upon the Canadian market, including tooth brushes, dentifrices and mouth washes, and upon the basis of this report the Canadian Dental Hygiene Council will publish to the profession and the public a list of those products it considers to be worthy of its approval.

An important principle involved in the organization of the Council is the inclusion of both professional and lay members. While dental hygiene is the particular concern of the dental profession, in its application it is fundamentally a matter of public health. The Oral Hygiene movement, as a national conception, can never be successfully consummated by the dentists working alone. The motives of the profession are sometimes misunderstood, and the whole movement construed as an organized effort to create a demand for dental services. The public is interested in public health, and dental hygiene propaganda will be best furthered by being carried on by a public body, with interested laymen playing an important part in the work.

The Canadian Dental Hygiene Council is to be congratulated upon the selection of the Honorable Sidney Mewburn as President. General Mewburn, as Canadian Minister of Militia and Defence during the war years, came to the mature judgment that dentistry is one of the most important branches of public health, and it was largely through the interest and support of General Mewburn that the Canadian Army Dental Corps was able to accomplish its great work for the Canadian soldiers.

What General Mewburn did for the Army through the Canadian Army Dental Corps, he hopes to accomplish for the people of Canada in times of peace through the Canadian Dental Hygiene Council.

The Council has decided to ask the Dominion Government for a substantial grant towards its work.

EACH is building his world from
within: Thought is the Builder;
for Thoughts are Forces—subtle,
vital, irresistible, omnipotent, and
according as used do they bring
Power or Impotence,
Peace or Pain,
Success or Failure.

—*Ralph Waldo Trine*



WILLIAM J. GIES, PH.D., SC.D.
NEW YORK CITY

ORAL HEALTH

A JOURNAL THAT STANDS FOR THE "OUNCE OF PREVENTION," AS WELL AS THE "POUND OF CURE"

Vol. 14

TORONTO, MARCH, 1924

No. 3

The Dental Educational Problem

WILLIAM J. GIES, PH.D., SC.D.

Members of the Dental Profession are urged to read the accompanying public address of Dr. Gies, delivered by invitation, at the second general meeting of the 65th session of the American Dental Association, Public Hall of the Arena, Cleveland, Ohio, September 11th, 1923.

The Carnegie Foundation have shown their trust in Dr. Gies' judgment by putting him in charge of their study of dental education which has been in progress since 1921. Dr. Gies' report of this important work and service in education will soon be published by the Carnegie Foundation.

The Department of Biological Chemistry at the Columbia University School of Medicine was founded by Dr. Gies twenty-five years ago. Dr. Gies' special interest in Dentistry led him into the field of Dental Research as early as 1909, and in the promotion of the School of Dentistry at Columbia University in 1916. In 1918 he founded the Journal of Dental Research.

In 1922, Dr. Gies suggested the formation of the American Association of Dental Schools of which he was elected temporary president pending completion of the organization in September, 1923.

WHEN I was invited to co-operate at this annual meeting, I expressed appreciation of the compliment and replied that it would give me pleasure to try to help wherever and however I might be useful. I am here, therefore, not from my own initiative, but because I was drafted.

I cordially invite public or private criticism and correction of what I shall say, for my comment will present some of the general conclu-

sions that may soon be published more in detail under very special circumstances. You would do me a favor, and perhaps prevent unnecessary annoyance later, for yourselves, if you would point out, here, to-night, or privately during the next few days, all important errors of judgment and all mistakes of fact that may be detected in this address. If my remarks set you to thinking, and if they initiate reflection and discussion, my immediate objective will have been attained.

Your Programme Committee gave me no opportunity to select a particular phase of the subject. They cheerfully assigned a very difficult task, in general, just as if they supposed I am as good a surgeon as Dr. Crile, and as competent as he to operate on the inoperable.¹ Fortunately, for me, although placed in the predicament of facing the "malignancy" of the dental educational problem, I have not lost a surgeon's privilege to "handle the case" in full accord with my own judgment. If I operate for gall stones, although the patient may be suffering from cancer of the stomach, remember that *that* is my privilege, in accordance with surgical custom.

I note the suggestiveness of grouping cancer and the educational problem together as "two of a kind."* All who may have wished to flee from the most unpleasant prospects at this annual meeting have helped to do so. Perhaps, however, the isolation of these two "incurables" here to-night is due primarily to the fact that the prevention of the one, and the solution of the other, are inherently grounded in the deeper and broader foundations of scientific health service.

Please note particularly that my last previous remark referred to "foundations" of "*health service*", and that I did not say foundations of *medicine*. I have been using the term "*health service*" to signify the whole system of service for the maintenance and restoration of health. This term has the good qualities of self-definition, comprehensiveness and convenience. It has none of the insignia of a banner of partisanship and none of the emotional characters of a war cry. The practice of medicine and the practice of dentistry are co-ordinate divisions of health service. They are like trees that have sprouted spontaneously from an old stump, the stump having long since disappeared—trees alike in kind and closely similar in appearance, growing somewhat divergently from the same roots in a common soil, through the same air of freedom and individual opportunity, in the same light, toward the sky.

I suggested a moment ago that I have not been denied a surgeon's privilege to "handle the case" in accordance with my own judgment. Your Programme Committee did not ask me to present, at this clinic, a *solution* of the problem. Perhaps it was feared that, if

*An allusion to an address by Dr. George W. Crile, on "the cancer problem."

I did, I might kill the *patient*. I have not been instructed to suggest any preventive measures affecting it, or any new remedies suitable for its treatment. Perhaps it was feared that, if I did, the patient might kill *me*. I have not even been given a clear case-history bearing on the diagnosis. I may evidently do as I prefer, or anything you will permit and to which the patient will submit.

I have been seeking advice, from expert diagnosticians, and as a consequence am suffering somewhat from vertigo. A roentgenogram, taken by Dr. Owre, indicates, in his judgment, that rickets is "the trouble" and that all that the patient needs is more light—very bright light—and lots of it. Dr. Logan insists that progressive anemia, complicated by aggressive neurasthenia, should not be overlooked in the treatment and that, excepting these disabilities, the patient is "all right." Dr. Friesell suggests, however, that Drs. Owre and Logan must be wrong in their diagnosis because they can't be right—they never are—and that, if all the doctors and all the nurses would keep away from the patient, and let him feed himself to suit himself, it would soon be evident that there is nothing the matter with the patient at all, and never has been, except one or two ordinary difficulties of no pathological significance attending rapid and healthy growth.

With these clear, though somewhat divergent, views of the situation, I am entirely in accord where I do not disagree. I feel just as certain and just as uncertain about some aspects of the prognosis as each of my diagnostic collaborators. But you are here in the interest of the patient, the responsibility for immediate action in your presence is mine, and I must proceed with our effort, whether the diagnosis proves to be right or wrong.

I conclude, as a philosophic basis for operative procedure, and as the major premise for my clinical analysis, that our distinguished young patient must be treated in such a way that he will grow normally into full equality with every other individual in all the qualities that make a real man. I take it that *that is the problem*—that the means to *that end*, if the means can be found and suitably applied, will put our patient—the dental educational problem—where dentistry belongs: on a plane of full equality in all respects with every other agency in scientific health service for individuals and communities in particular, and for humanity in general.

What, let us inquire, are the indications that dentistry has vitality enough to react favorably to the means that may have to be applied to help it to attain full equality, in character, capacity, and career, with every other kind of scientific health service?

Have you noted the full significance of the sturdy growth and precocious development of dentistry? Let's go back to early history for a moment, and consider what has occurred.

Eighty-five years ago, in this country, a few practitioners of dentistry saw clearly that health service affecting the teeth deserved

the special attention of physicians. When, however, they sought to induce an important faculty of medicine to include instruction in dentistry in the medical curriculum, that group of physicians said emphatically and intolerantly, no! Despite the presumptive breadth of their knowledge and profundity of their wisdom, these physicians of 1839 lacked medical vision and, worse than that, they were woefully deficient in medical common sense.

The few who saw the vision of better health service in dentistry were devoted and courageous enough to exalt the faith that was in them. The spirit of progress that has been coming down through the ages was firing their thoughts and moving their hearts. Finding that dentistry would be unwelcome in the fellowship of medicine, those men of noble purpose did the best they could to serve—they founded an independent College of Dentistry. They gave birth to dentistry as a co-ordinate division of health service. They put dentistry on the path to membership in the group of learned professions.

A few days ago, the same College of Dentistry, "the oldest dental school in the world," was welcomed into union with the dental school that is now co-ordinate with the medical school that could not tolerate, in 1839, the idea of such a professional association. This great historic reversal, at the University of Maryland, is highly significant of the development of a new spirit in health-service education.

The first school of dentistry met an important public need. For thirty years after its foundation, however, the universities "couldn't see" dental education. Nevertheless, and fortunately under such circumstances, independent dental schools rapidly increased in number. It was soon found, by the commercially alert, that independent dental schools could be conducted at a financial profit, just as medical schools were then being managed. Following the example of distinguished practitioners of medicine in all parts of the country, who blazed a golden trail, leading dentists established dental schools that frequently were founded quite as much for the money that could be made *from* them as for the educational and professional service that could be rendered *through* them. In this regard dentistry made the mistake of following the leadership of medicine. Happily for dentistry, however, the degradation of dental education by the selfishness of unworthy commercialism seems never to have been as low or as disgraceful as that of medical education. Fortunately for dental education, again, the reorganization of dental education, into accord with the professional requirements of scientific health service, has been relatively as rapid and sincere as that of medical education.

Perhaps a few in this audience have not learned just what and how much has been going on in this particular relation. Two years ago, by an evolution that had been in progress for fully fifty years, only fourteen of forty-six dental schools then existing in this country were frankly proprietary in character or were conducted on a plane

that was obviously commercial. Of that group of fourteen, *two* have been absorbed by dental schools in universities; *one* has become a *new* integral part of a university; *three* have effected affiliations with universities, that are expected to be initial steps to organic union; the owners of *one* endeavoring seriously and honorably to make the school an integral part of a university; *five* have been, or are about to be, transferred to Boards of Trustees of organizations formed to conduct the schools as non-proprietary educational institutions (although the owners preferred, and the new organizations desire, to make these schools parts of universities); *one* has suddenly been changed from a school of dentistry to a school of engineering; and *only one*—a grade-C concern—appears to expect to continue as a proprietary school. In addition, and even more important, mercenary or indifferent management of dental schools, *by some universities*, has been very definitely discouraged, in notable instances has been discontinued, and in all cases will soon certainly disappear.

Accordingly, it may be said, with truth and profound satisfaction, that the era of commercial demoralization of dental education has been quietly but none the less surely coming to a close. The tumor of commercialism has been successfully excised from the body of dental education without any seriously unhappy consequences whatever.

The men who have made these changes, in their schools, have permitted their professional instincts, and their aims in public service, to over-ride the promptings of self interest. It is a pleasure publicly to commend all of them, individually and collectively, for the honorable way in which these important changes have been effected, and for the sportsmanlike manner in which the owners have accepted the verdicts of progressive professional opinion.

Two years ago the "pre-dental fever" was approaching a crisis. Our patient was very unhappy. Now all signs of deleterious effects of the fever are absent. Recovery has been complete. Two years ago only twenty of the fifty-one dental schools, then existing in Canada and the United States, required at least one year of college work for admission to the first-year class; and of that number, eighteen were requiring it, in 1921, for the first time. Now more than half the whole number of dental schools in Canada and the United States base the study of dentistry on an entrance requirement of at least one year of college work, and the Dental Educational Council has included a pre-dental year of college work among its minimum requirements for a Class-A rating after 1926. Judging from numerous preliminary announcements, practically all the schools of dentistry will require at least one year of college work for admission by 1926, when ten or more, including all of those in the State of New York, will require at least *two* years of preliminary education of college grade. Montreal and Rochester Universities have announced a

requirement of *three* years of college work for admission to the study of dentistry beginning in 1925. Montreal will require four years, beginning in 1927.

These developments in dental education closely resemble those in medical education. The features common to the growth of both have been as closely similar as the resemblances often seen between brothers. The further growth of a younger brother may often, though not always, be accurately predicted from that of the older.

There has been signal development of vitality, strength and efficiency, in the body of dental education, from the recent cessation of conflicting and wasteful functions. The administrative and teaching groups have been amalgamated into a co-ordinated whole for the support and betterment of dental education in North America. There has been complete elimination of the need, among good fellows, for protection of friends and colleagues in the ownership of private educational property, with all the petty bedevilmments that radiated from that personal need. Doubt regarding the desirability of basing the higher aspects of dentistry on preliminary education of college grade has been removed. Realization of the need for thorough training in the medico-dental subjects has become universal. There is growing appreciation by the universities of their duty to regard dentistry as a learned profession and to provide for its fullest and freest development. These important conditions made inevitable the recent establishment of the American Association of Dental Schools, and have provided for that Association a broad foundation of opportunity for uncommon usefulness.

The earnest purpose of the new Association, and the strength of the educational and professional platform on which it stands, may be judged from the following statement of its objects as given in its constitution:

"The American Association of Dental Schools has been established to facilitate intercourse and conference among *teachers* of the dental sciences and arts in North America; to promote advancement of *teaching* and research in American schools of dentistry; to encourage thorough study and discussion of the needs and problems of dental education; to improve public understanding and appreciation of the quality and value of dentistry; and to maintain dental education in full accord with the highest requirements of professional education in the public service."

The Canadian acceptance of the invitation to amalgamate the Canadian Dental Faculties Association with three similar bodies in this country, in the American Association of Dental Schools, was not only a sign of the highest degree of professional cordiality, but also an act of the most gracious international amity. Historically, it was an outstanding revelation of the fine quality of altruism that animates the leadership in dental education in Canada, and an

expression of the confidence of that leadership in the good will and professional integrity of their colleagues in the United States. I hail the generous co-operation of the Canadians, and our delight to have it, as signs of a new bond of fraternity between their people and ours, and as another of the many lines of attachment between us that will hold both nations together permanently in warm friendship and in mutual trust, respect and esteem.

The Canadian universities are among the best in the world—and every Canadian dental school is a part of or closely affiliated with a university.

A university represents, as a rule, the best type of public agency for the promotion of advanced education in all its branches. The management of the university, as a rule, is competent and altruistic. The university is trusted by the people to promote the public welfare as against the private or personal interests of its managers and officers. Accordingly, the university receives gifts and acquires cumulatively a permanent endowment in support of the functions it performs, and is *expected* to perform, generously for the benefit of the public.

Independent professional schools, if proprietary, cannot, for obvious reasons, expect to receive endowments. Independent schools that are non-proprietary rarely obtain endowments, because the public senses their scholastic disability, from lack of academic associations, and not only refuses to believe that they *can* be as useful as they would be if they were parts of universities, but also and for that reason declines to help them financially. This tendency has been growing rapidly everywhere.

The School of Dentistry of the Royal College of Dental Surgeons of Ontario is an exception that proves the rule; although in a sense it accords with the rule, for that school is conducted by the whole dental public of Ontario in the spirit of a university and in close affiliation *with* a university.

These facts indicate why, all other things being equal, there is advantage to dentistry from general incorporation of the dental schools into universities. The university will be trusted to give to each of its parts a proper share of gifts and receipts from endowments; and because of the university's altruistic relation to the public, the university may expect to receive, and can suitably invite, endowments for such specific purposes as the promotion of dental education. If, however, a university uses a dental school as one might use a cow—to provide food for all the members of the family—then membership in a university may be detrimental rather than helpful to the work of a particular group of dental teachers. Nothing whatever can be said in behalf of such university management, from the point of view of promotion of dental education.

There has been considerable misapprehension on the latter point among university presidents and trustees. They have been led to

believe, by dentists, I regret to say, that a dental school can be properly conducted not only on a basis of financial self-support, but even as a money-maker for the whole university. Much maladministration of university dental schools has resulted from promotion of this erroneous idea and also from suppression of the real truth in this relation.

I have lost no opportunity lately to rectify the gross error that has been made in this connection. Dental education deserves, and should receive, specific endowments for its promotion. It should receive a full share of all the advantages that now accrue to the teachers, investigators and practitioners of every other type of scientific health service. The universities owe it to the public, to dentistry, and to themselves, to make this situation perfectly clear to all concerned, so that the spirit of philanthropy may be induced to give to dental education the support and encouragement that the fullest growth and greatest perfection of dentistry require.

The prospect of early rectification of this situation is very bright, because of the awakening now in progress in the universities all over the country.

In this relation a few statistical items may interest you. The number of *independent* dental schools in the United States has dwindled, since 1921, from fourteen to seven. Of the forty-three dental schools now existing in the United States, thirty-four are parts of universities and two are parts of associations of professional schools. Of the thirty-six schools in these two groups, all but three are parts of institutions that contain undergraduate schools of medicine, with which the dental schools are, or could be, effectively co-ordinated. Each of the five Canadian dental schools is a part of, or is closely affiliated with, a university containing a school of medicine.

If, now, I revert again, in figurative language, to our patient, whose "case-history" we have been following in general terms, it may be said that outstanding evidence of the vitality of our patient, and of his capacity to surmount new difficulties, is the fact of his rapid and steady growth from infancy. Very recent indications of that vitality are his complete recovery from the successful operation for the removal of commercialism; complete recovery from the "pre-dental fever"; complete recovery from perversions of the functions of some of the *internal secretory* glands; effective scholastic competition with other agents in scientific health service—and his growing acceptance in important circles where good health and achievement in public service are prerequisites for admission.

Discussion often causes confusion when there is lack of agreement on the meaning of the terms employed or on the definitions involved. Are we agreed in our views of dentistry's character, duties and opportunities?

The *lay* public expects dentists to be intellectually, morally, and

professionally, the peers of all who are engaged in scientific health service. The lay public expects dentists to be competent to render personal health service in a thoroughly modern and practical manner and primarily for the welfare of the patient. It knows little of scientific requirements and is often unable to tell the difference between very good service and very bad service. It is completely at the mercy of its health servants. But the lay public is rapidly informing itself about the full significance of the hurried attention in brief appointments to localized tasks without concern for correlated conditions of distress and with "next-next" accelerations of doleful processions through the offices of many machine-like practitioners.

The *educational* public, which is a very large and alert portion of the lay public, readily detects signs of intellectual and cultural inferiority. It knows that the modern opportunities for health service cannot be met fully by anyone who lacks the degree of professional education or experience that is necessary for an understanding of the *scientific* requirements of such service.

Physicians and surgeons know that dentistry has not been basing its craftsmanship as solidly on the medico-dental sciences, as competency to cope with the processes and variations of dental and oral pathology requires. Leading physicians and surgeons find it difficult or impossible to co-operate effectively with or professionally to trust, those who cannot talk the language of general health service, and who do not think in terms of that language.

Investigators in the biological sciences (their number is rapidly increasing everywhere) are particularly competent to detect wholly superficial, unverified, and often absurd, views on which the *biological* aspects of certain features of dental practice have been based empirically; and such men astonished at the general indifference to research in the *biological* aspects of dentistry justly doubt the efficiency and desirability of much that is done in the name of dentistry.

Dentists who have had the advantages of training, not only in dentistry, but also in medicine, deplore the multitude of errors in the pathological judgment of those whose training has been mainly in dental mechanics and whose vision of dentistry has been kept almost wholly within the narrow confines of such limited training.

Most significant of all: such valiant champions of dentistry, and of its highest aspirations for successful health service, as Dr. Kells, careful clinician, cautious conservative, and conscientious critic as he is, speak as follows, as did Dr. Kells recently (in part) on the important public occasion of his recipiency of one of the distinguished honors in dentistry:

"I believe I have been a rather close observer, and I have had, during forty-five years of a rather full practice, ample opportunity for observation, and I have never yet seen an alveolar abscess that was not directly caused by either a dead pulp or pyorrhea.

"Thousands of dentists the world over, basing their opinions upon countless thousands of *apparently* successful treatments of infected root canals, boldly proclaim that by proper treatment, some infected teeth can be freed from infection.

"Unfortunately, probably not a single one of these thousands of dentists is in a position to prove his work. That part of it is absolutely without the province of any practising dentist, and can only be done in a clinic of some kind.

"Friends, this is generally conceded to be the 'age of science.' Dentistry is a science, but no science can progress without the deepest kind of scientific study and research work.

"Is it too much to hope that the day will come when dental research work will occupy as prominent a field as medical research work? As a matter of fact, should they not keep pace with one another? Five years of such intensive study would put dentistry upon a different plane in the scientific world.

"On January 31st, 1913, Dr. Charles H. Mayo delivered an epochal address before the Chicago Dental Society, in which he made the now historic statement: 'The next great step in medical progress in the line of preventive medicine should be made by dentists. The question is, will they do it?'

"Ten long years have passed since that memorable occasion, during which time dentistry has striven its best to answer Dr. Mayo's question in the affirmative, and here, to-night, I do not hesitate to say that, notwithstanding all of its efforts, it has thus far signally failed to do what was hoped of it.

"I am confident that every one in this room loves his profession. I am confident that each and every one wants to see the science of dentistry continue to advance. I am sure that all of us realize the handicaps under which our science is laboring."

In my own enthusiasm for dentistry as one of the most useful forms of scientific health service, I may be expecting too much of it; but this, in general, is what it seems to me that it is; or ought to be, if it is not; or will be very soon, if it is not now:

Dentistry is the learned profession that is devoted

- (a) to establishment of the principles, and to application of all forms of scientific health service relating *directly* to the teeth and adjacent oral parts; and relating *indirectly*, through such service, to the welfare of other parts of the body and of the body in general.

Dentistry also includes

- (b) establishment of the principles of correlation between dental and oral conditions and systemic diseases. It includes the discovery and *provisional* diagnosis of dental and oral symptoms that indicate or imply the prevalence of ill-health

elsewhere in the organism. It includes an *advisory* health service for the patient based on such a diagnosis.

If it should be suggested that the term "dentistry" refers logically to teeth only, and that a word like stomatology would be more acceptable for what others, has acquired meanings from usage and from convenience that transcend all other considerations, and should be retained as long as the conveniences of usage make it acceptable.

If the definition I have given is a sound one, the work of the dental hygienist is one of the simplest expressions of dentistry. The definition comprehends the whole of major oral surgery, one of the most complex expressions of dentistry. If this definition is not illogical, then the entirety of dentistry is co-ordinate with every important division of health service; is a part of the *whole* of health service, regardless of traditions, partisanships, or prepossessions; and must be grounded ethically and educationally as solidly and as broadly as every other important division of health service.

If my definition is valid—and I believe it is a comprehensive expression of a proper professional view of the full content of modern dentistry—certain obvious truths flow from that definition, among them the following:

It is a function of research in *dental schools* to establish and to extend (a) the principles of modern dental and oral health service, and (b) the principles of the collateral *advisory* health service that may be properly performed by dentists.

It is a function of *dental schools* to teach the principles of, and to afford training in the application of the principles to (a) modern dental and oral health service, and (b) such collateral *advisory* health service as may be suitably rendered by dentists.

A responsible dentist should be a competent diagnostician of all dental and oral disorders. He should be versed in the knowledge of the relations of all dental and oral conditions to systemic disorders.

A responsible dentist should be a master of accumulated knowledge pertaining to the symptoms of systemic disease that may appear in the mouth. He should be competent to apply this knowledge to promotion of the welfare of his patients. He should perform the collateral *advisory* health service of giving suitable *guidance* to the patient, in full realization of his professional duty to every one in his care.

It is obvious, of course, that all the great excellencies of traditional dentistry, and its achievements in prevention, treatment, cure, extraction, restoration, substitution, adjustment, readjustment, etc., are included in the scope of the definition of dentistry I have proposed. It is equally obvious that the definition implies that, in teaching the mind of the dentist to think, his hands must also be trained most effectively to do.

Our problem does not include any difficulty regarding continu-

ance and perfection of training in the mechanical arts of dentistry. This is essential. Here agreement is unanimous. It is a waste of your time to go into this phase of the subject. Nothing seems more certain—and in the name of humanity, I wish it were not—than the inevitability, for many years to come, of widespread continuance of dental and oral diseases, and of the necessity for corresponding removals, and for mechanical substitutions and artificial restorations. I believe they are about as inevitable for civilized man as death itself; and that evolutionary forces involving, among other effects, ultimate complete loss of the third molar, are not the least of the influences that will mock our efforts to gain complete, or even relatively complete, preventive control.

Let no one misunderstand my position to mean proposed subtraction from dentistry of any good quality it now possesses, or of any useful service it now performs. My remarks allude chiefly to *additions* to its distinguishing qualities and to *extensions* of its avowed service, with all the most important phases of it on a broader foundation of learning and on a higher plane of understanding than now. Our problem does not include any question of continuance of thorough training in the mechanical arts of dentistry—it relates rather to the question whether the function of dentistry should be expanded, and whether additional and modified training, in accord with the requirements of the expanded function, should be included in what we conveniently call dental education.

At the risk of tiring you by repetition, but with a purpose by recapitulation, to prevent misunderstanding, permit me to urge that the primary need, in dental education as a system, at the present stage of its evolution is its early and orderly placement on a basis of scholastic *equality* with what is now called medicine, both in the character and scope of the preliminary study required, and in the depth of the scientific foundation afforded. Dentists and physicians should be able to co-operate intimately and effectively—they should stand on a plane of intellectual equality and should be able to “talk the same language.” The dentist should obviously be educated to study his problem with a *medical mind* and trained to perform his special service with *medical understanding*. He should be equal to the physician in the quality of his service as a guardian of the health of individuals and of communities. His localized dental and oral service should be rendered with full comprehension of the general relation of that service to the welfare of the body as a whole, as well as to the individual bodily parts directly involved or immediately adjacent. He should comprehend the meaning of the oral signs of systemic disease and should give *advisory* health service accordingly.

Dentistry can no longer be accepted as mere tooth technology. Its function including all that has risen to the dignity of scientific health service. The developments of medical knowledge in general,

and of dental science in particular, have made it obvious that the dentist should have the understanding and capacity of a physician in all the requirements of successful prevention, diagnosis, treatment and cure of disease, as well as the skill and efficiency of the surgeon in the mechanical arts of adjustment, removal, substitution, and restoration. Trained technicians and assistants will always be needed for useful empirical service in co-operation with dentists, physicians, and sanitarians in general, and for the performance of the simpler mechanical tasks of dental art, including laboratory work. If and when the supply of such assistants falls below the demand for them, the need for them can be appropriately met by special measures. What humanity now requires most of all, of "dental education," is an increasingly larger number of men and women who will practise *and develop* the wider reaches of dentistry with the advantages of an advanced preliminary education; with knowledge and judgment acquired on a solid foundation of study of the medico-dental sciences; and with the capacity and skill derived from a thorough practical training in the arts of diagnosis, prevention, cure, and treatment of dental and oral disorders, with due regard for their systemic sequelae and their systemic correlations. There is growing need, in short, for dentists who will be not only dental *surgeons*, but also dental *physicians* and dental *sanitarians*.

I have not suggested a belief that all dentists should be expected to attend to the same details of health service or to receive entirely the same training. Specialization within the dental division of health service is inevitable and desirable, as in each of the other divisions. The creation of the dental hygienist is an illustration of the trend of the times in the establishment of accredited subordinate service within the scope of dentistry, and under the supervision of responsible dentists.

I would not be surprised if I were told that many in this audience earnestly *believe* and *fear* that the proposed elevation of the educational requirements for admission to the study of the *most important phases of dentistry* would reduce the number of practising dentists below that required to give all the people everywhere all the dental health service they desire or need, or both. I should be glad to discuss this subject in full detail, privately, with any who seriously fear this result as a consequence of the gradual and reasonable elevation of educational standards. For the present it may suffice to ask a few direct questions in imaginary reply, on the assumption that the hypothetical belief or fear can be considered, in this way, in terms that will not involve further doubt and which cannot be misunderstood.

Do dentists, after graduation, prefer to establish their practices in towns of, say, 1,000 population or less? Do they prefer to live in towns that are removed as far as possible from cities, and where the

economic and social conditions are uninviting, but where there are special openings for health service that is urgently needed but will be poorly recompensed? Or, do dentists, like physicians, prefer just the opposite—to go to the larger centres of population, where conditions are prospectively more promising for the practitioner himself as a person—and despite the fact that the opportunity for personal health-service may not be so great there as it would be in a village, because a large number of practitioners are already on the ground in the large centres?

If twice as many dentists should be graduated in 1924 as were graduated last spring, what proportion of the extra output would probably open offices in towns of, say, 1,000 population, or less, where there are now no dentists? How many dentists would have to be graduated next spring, let us say, to “drive” at least one dentist into every village in the United States? Would graduation of even a million do it? Would excessive “competition,” from an over-abundant supply of dentists, “drive” the surplus number of dentists into the villages, *or out of dentistry*? What would the overcrowding of the cities, by dentists under conditions of undesirable competition there, do to the morale of dentists and to the character of dentistry?

What conditions determine the distribution of practitioners of dentistry? Is opportunity for the largest possible degree of humanitarian service, *without regard for the prospective economic advancement and social contentment of the practitioner himself*, the main determining condition?

If I were to start an unlimited supply of water running from a spigot on this platform, would the water spread out uniformly over the floor, as I might desire, or would it run along lines of least resistance, as gravitation might determine?

In this relation I feel impelled to say that it is a matter of very great regret to earnest students of the technology of professional education that the degrees of *Doctor of Medicine* and *Doctor of Dental Surgery* were ever conferred as symbols of the completion of undergraduate courses in medicine and dentistry. The degrees of *Bachelor of Medicine* and *Bachelor of Dental Surgery* would have served every useful *public* purpose as well or better. Bachelor degrees in medicine and dentistry would have been academically analogous to other bachelor degrees; and their award would not have implied the acquisition of *advanced professional* knowledge and training, for which the doctorate degrees in medicine and dentistry, as they have been bestowed, have been and are relatively false symbols.

If the degrees of *Bachelor of Medicine* and *Bachelor of Dental Surgery* had been regarded as academic signs of ability safely and sanely to *begin* the practice of the corresponding *arts*, two higher degrees of conventional usage—Master and Doctor—could have been effectively employed to signalize successive stages of further

advancement in knowledge, training, experience and wisdom. The degrees of Master of Dental Surgery and of Doctor of Dental Surgery could have been used by the dental schools as proper incentives to further intellectual and professional effort on the part of practitioners, and would now be helpful publicly to distinguish completion of post-graduate and graduate studies, in dentistry, to the highest possible satisfaction of the dental profession and of the public. A *Bachelor* degree might now be made the symbol of a training that would meet the *minimum* legal requirements for the *beginning* of practice.

I am hopeful that leaders in the various divisions of education for health service will include this important subject among the many that should engage their earnest attention, in the reorientation and re-co-ordination of all phases of health-service education that are now in order and will soon require general consideration. Present custom has been frozen into a rigid system by the state laws. General discussion and agreement, and concerted action based on agreement, are prerequisites to any general improvement in this direction.

I call your very special attention to the fact that, if the proposed widening and deepening of the foundations of dental health service should be adopted, when the time is ripe for such acceptance, dentistry would then be in fact the peer of medicine, would be so regarded by medicine, and would be accepted *as such* by every other health-service agency and *also by the public at large*. You and I know there is "something wrong somewhere" at present. Let me turn a flashlight on a particular spot. When has dentistry "figured" in any of the annual medical and public health congresses? What was its share in the important Annual Public Health Congress in Chicago last March? Why was dentistry completely ignored there? Did you know that dentistry was entirely "out of it" at that Congress? It certainly should not have been, but it was, although I believe for the last time.

The Congress continued for three days. The *general* subjects on the programme were medical education, medical examinations and licensure, hospital service, organization of the public for co-operation with the medical profession, public health. An entire afternoon was devoted to the latter subject—*public health!* Not a single dental paper on the long three-day programme. Not a single dentist named on any part of the programme. Think of it! Think of it! I wish I could "ring a bell on it" so loudly that the "racket" would be heard by every living dentist.

You are the attorneys in dental health service for all the people. They are your clients. You owe it to them, and you owe it to yourselves as their trusted servants, to advise them what they should do to obtain the best dental health service when they need it. You owe it to them and to yourselves to show them persuasively how they

can and should help to support the promotion of dental health service everywhere and the system of education on which such service must be based.

I speak to-night not only as a professor of dental science—and, therefore, as one of you, in spite of any objection you may have to the accident—but I speak also as a layman. Representing, and speaking for, the great body of the people—practically all of whom need your service frequently—I publicly note the fact, here and now, that we have been looking you over. We see right through you. We like you. You are earnest, efficient and faithful. You are progressive. You are modest enough to believe you can do better. You will never be satisfied with any stage of progress that does not put your health service as high *in quality* as any other. You will “go the limit,” if the public will endow your schools and multiply the agencies through which you can render better and enlarging public health service.

I have sought, in this address, to stimulate reflection and to excite discussion. Of the many phases of the general problem of dental education, only a few were selected for this purpose.

I cordially appreciate the sustained attention this large audience has accorded my remarks. I thank you for the indications of approval that you have given so generously.

Juvenile Jingles

Where Germs Can Dwell

Wonder how wee germs can tell
Where it's safe for them to dwell?
Never seek a mouth that's clean,
Where no brush is ever seen;

Always seem to find a place,
Though it is a pretty face,
Where a little mouth can stay
Oft unwashed from day to day?

There the germs delight to go,
Do just dreadful things, you know;
Hide between two little teeth,
Damage them beyond belief.

Down the throat they even run,
Spoiling tonsils as they come.
Once a germ has come to stay,
More germs follow right away.

Naughty germs will never come,
If well washed are tooth and gum;
Never harm, I am quite sure,
Where the mouth is sweet and pure.

—Dora L. Cameron.

Full Denture Construction for the General Practitioner

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(Continued from last issue.)

A PSYCHOLOGICAL CONSIDERATION OF THE PATIENT.

THERE are two courses one hopes some day to see in the curriculum of every dental school in the United States. They are: First, a good course in Office Administration and Business Economics; and, second, a course in applied Psychology. Here, only one shall be considered briefly: Psychology and its relation to full denture construction.

In this connection let us consider two extreme cases.

Mr. A comes into the office to have a set of artificial dentures constructed. He is healthy and robust and does not seem to have a care in all the world. It is found upon examination and questioning that his teeth were extracted some four or five years ago, and he has been "gumming" it and apparently enjoying the experience. It appears further that Mr. A has a wife and daughter who seem to have suffered more from the loss of his teeth than he, and their sorely-wounded pride in father's appearance at the family's social functions has finally driven them to constant begging and pleading that he get a set of dentures. To ease their minds and stop their nagging—and for no other reason—he comes. He patiently submits, in a good-natured, uninterested way, to all the processes of construction, and when they are finished possibly it is noticed that the adaptation is not just as had been expected, and the occlusion is not quite right on one side. The esthetic effect is not beyond criticism.

With the usual instructions regarding care and use, the patient is dismissed for a trial and advised to return in three or four days. Time goes on and on, but Mr. A does not return, and in three or four months the dentist chances to meet him on the street. In the course of a mutually pleasant greeting, it is noted that he is wearing the dentures. Constant use is evidenced by the pipe and cigar stains. Upon inquiry why he did not return for the final adjustments, his reply was that he could eat well enough, and that they "don't hurt." He may also say that he did not want to bother the dentist. This is the one extreme and it is met all too seldom.

Next comes Mrs. Z, a small, nervous, anemic individual, who has suffered all the catalogued ailments and has been mercilessly robbed by physicians and dentists. She intimates that she has no confidence in the dentist's ability, but on the recommendation of

Mr. A, or some other satisfied patient, she finally decided just once more to get a set of dentures that would be at least partially successful.

As she relates her tale of woe, she carefully deposits upon the dental cabinet six or eight different sets of dentures, all of which appear to be above the average. She is permitted to talk and talk and then talk some more, because she is giving most valuable information regarding her mental attitude. When she has finished her story, she is asked questions that might lead her to believe that the dentist was very much interested in her experiences, but he is careful never to show sympathy. Simple compound impressions of the upper and lower arches are then secured as soon as possible, and she is dismissed for a period of from two to five days.

At the next appointment Mrs. Z is not taken to the operating-room but to the business office, where she is seated and shown the study casts which the dentist has meanwhile made from her impressions. He goes over them with her very carefully, pointing out the hard and soft areas and explaining the difficulties that they inject into her case. Muscle and tissue attachments, and what they mean in denture construction, are mentioned. All the peculiarities of her case and the difficulty of overcoming them are explained. In other words, everything possible is done to *get her interested in her own case*.

Then it is explained that there are three things that contribute to the success or failure of artificial dentures. They are: 1, Articulation; 2, Adaptation; 3, Muscular Training.

It is explained that articulation is the way the teeth come together in their proper relation during the act of masticating or chewing the food. Securing this is the dentist's responsibility and something that she cannot help with in the least.

Adaptation is the way that they fit in place in the mouth, and must be secured by the dentist and without her assistance.

Muscular training. This is the training of the muscles of the face and jaws to tolerate and assist the dentures during mastication. These dentures are like a foreign substance placed in the body, and nature naturally resents them; and it is only through patience and training that this resentment may be overcome. This may require from three weeks to three months of constant practice before it is accomplished, and *this is the patient's responsibility*, and the dentist can be of practically no assistance to her. In other words thirty-three and one-third per cent. of the responsibility for the success or failure of the dentures rests solely with the patient. Mrs. Z is encouraged as much as possible, but great care is taken to make her but one promise and that is *trouble*.

A very frank explanation is then made as to just what these dentures will cost her, and that one-half of the fee must be paid at

the next sitting and the balance paid *when the teeth go out of the office*. If she is willing to accept her share of the responsibility, the work may be started at once.

If she does not care to go on, then there is a fee of five dollars due for mouth examination and consultation, of which your study casts and time are evidence.

When the work is started, and during the progress of construction, everything possible is done to keep her interested in the case, and one must always be very careful never to let a bad impression or wrong psychological influence enter her mind. It is far better to be perfectly free and frank in acknowledging mistakes and never hesitate to repeat any portion of the work as often as it is necessary.

Then the dentures are completed to the best of the dentist's ability. He sees to it that there are no sharp or rough margins, that the length is as it should be, that the occlusion and articulation are as nearly balanced as possible at this time. The dentist makes sure that every detail is the best that he can do; then collects the balance of the fee which she was instructed to bring at the last sitting.

Mrs. Z is then instructed to wear the dentures all that she possibly can without excess tiring. She may remove them for ten or fifteen minutes at a time in case the muscles get very tired. Otherwise she should keep them in her mouth *all the time* day and night *except at meal times*, when she should take them out and put them in a glass of clean cold water, because she can not yet eat with them and they are not yet finished. She is told that she cannot injure them if she tries to eat with them, but that it is pretty certain that she cannot do it, and that she may need considerable training before she is ready for that step.

Perhaps every dentist has had, some time or other, a patient who would follow these instructions, but he may be reasonably sure of one thing and that is this: That fifty per cent. of them will eat something with those teeth *before they get home*, and the other forty-nine per cent. will go directly to the kitchen as soon as they arrive home.

If they find by chance that they *can* eat, and they will try their utmost, they glorify over the fact that they can do something that the dentist said they could not! They are better than he thought they were; and when they return for adjustments they come in beaming all over and tell you that they just could not resist the temptation to try to eat something and how they tried it and found that they *could "eat just fine!"* Well, the dentist's troubles are practically over with that patient.

If the patient should try to eat something and in so doing should really experience a great amount of difficulty (which they really should not), they are not in the least disappointed or disturbed. It only proves that the dentist knew his business. He said that they could not eat and they cannot. In this case the final adjustments,

such as "milling" or "paste grinding," described in a later chapter, should correct the trouble.

Here two extreme cases have been briefly described. All others come some place between them, but the point is this—that there are no two cases alike. Every patient's viewpoint and attitude is different, and it takes a real student of human nature to diagnose the individual type that he may have to deal with and then issue the proper treatment for that type.

Never lose sight of the fact that psychology plays a very important part in artificial denture construction, and that dentures that are *paid for* always give the best satisfaction.

(CLASSIFICATION AND CASE RECORD CHARTS.

The definite classification of various mouth conditions found in edentulous cases has received the attention of many different prosthetists during the past few years. The need for such a classification is very evident, but most of those produced have been too complicated and technical for efficient use by the general practitioner.

Mr. Samuel Suplee, of New York, presented possibly the first classification that attracted any considerable attention. This form was complete in almost every detail, but was more or less unwieldy and contained much data that was of no use to other than a prosthetic specialist.

Many other forms of classification have been presented, according to the different author's ideas of what information was of value, but few, if any, of them have suited the ideas of any considerable number of the profession. Some certain portion of the classification plan might be considered most important by its author, while the next man who attempted to use it might discard that part altogether. Every operator knows well the things that cause him the most trouble and the things that he wants to record, and these may vary as much as different technics vary; still they all accomplish the same result. It seems to be pretty generally agreed that the following list includes most of the points of value that should be recorded as a matter of record in our edentulous work. To this list may be added others or possibly some of these taken away, according to the likes or dislikes of the operator.

Hard and soft areas: their extent and location.

Ridge conditions: hard, thin, medium, soft, flabby, or rolling.

Muscle and tissue attachment around the periphery.

Arch form.

The coronoid space, or the distance between the posterior tuberosities and the coronoid process when the jaws are closed.

Arch size and relation.

Saliva: quantity and character.

Has patient worn dentures? How long and kind.

Date of extraction.

Mold and shade of teeth.

General health condition.

Name, address, business, phones.

Referred by whom.

A simple form of inserting the desired information for each case is to use Class I, Class II, and Class III, under each heading. Class I can represent the ideal, Class II the average, and Class III the very difficult. Plus or minus signs may be added to give more detail. Class I can also signify very large, Class II medium, and Class III very small, according to the information desired and the standards established by the operator.

Such case records are not only very interesting to keep but will many times prove very valuable to refer to when the patient returns for some further service. Often much trouble and embarrassment may be avoided by a reference to a case history when one patient refers another to you for a similar service.

Mrs. A refers Mrs B to you for dentures. In looking back over Mrs. A's case-record you note that hers was almost an ideal case from beginning to end. Upon examination, you find Mrs. B's to be an extremely difficult one. Will you, then, in the face of this evidence promise Mrs. B. the same high quality of efficiency that you were able to produce for Mrs. A? It would be very foolish for you and very unfair to the patient if you did. It is a well-known fact that just in the proportion that mouth conditions differ, in that proportion we find that success and efficiency in the finished product differ.

(To be continued.)

A Catechism of the Acute Respiratory Diseases

Q.—What are the acute respiratory diseases?

A.—The common cold, bronchitis, broncho-pneumonia and pneumonia. These are the acute inflammatory diseases of the air passages, beginning with the nose, extending on to the throat, down through the bronchial tubes to the bronchioles, and into the lung substance. While these diseases may and do occur to a greater or lesser degree at all times of the year they are decidedly more prevalent during the late autumn, winter and early spring months.

Q.—What is the difference between acute cold in the head, acute catarrh, acute rhinitis and acute coryza?

A.—They are all practically the same, and constitute what is referred to as "the common cold," that is, an inflammation of the mucous membrane of the nose, in which there is first, congestion and a dryness of the entire nasal mucous membrane, followed by a free discharge.

Q.—What are the principal causes of this condition, or the so-called common cold?

A.—We have repeatedly drawn attention to the fact that the majority of people are carriers of the germs that are responsible for common

colds, and for the other acute respiratory diseases. These germs constitute not a triple alliance, but a quadruple alliance—that is, the staphylococcus, the pneumococcus, the streptococcus and the bacillus of influenza. During the winter, these organisms are individually or collectively more or less constantly present on the mucous membrane of our upper respiratory tract, particularly in connection with the tonsils and on the mucous membrane of the entire nasal tract. Fortunately for us, however, nature's powers of resistance, that is, the normal mucous membrane, are capable of holding these organisms at bay. However, when conditions arise that lower the resisting powers by producing irritation or congestion of this mucous membrane, these first walls of defence may be broken down.

The conditions that give rise to this lowering of resistance are rather complex. There are both exciting and predisposing causes. The exciting cause, for instance, may be due to mechanical or chemical substances in the inspired air, such as particles of grit and dust, abrading the mucous membrane, and thereby opening up channels for infection. Then there are irritating substances such as the various gasses and smoke. The acid contained in smoke is not an infrequent cause of irritation to the mucous membrane of the nose and throat.

Furthermore, this membrane may fail to work properly, as a result of the general unhygienic conditions under which we are living, in addition to those connected with the air that we are breathing.

Then there is the predisposition caused by growths in the nasal passages, and malformation of the septum, or the partition between the two nasal cavities or nasal passages, all of which increase susceptibility to these acute catarrhal conditions.

In addition to these, there are the general constitutional conditions arising from a lowering of the vitality through undue exposure to cold. This can be most frequently traced to wet and cold feet, particularly if these conditions be prolonged. They result in the extraction of an undue amount of heat from the body, and therefore give rise to lowered resistance in the nasal mucous membrane, as well as of the body generally. Inasmuch as there is at all times a pitched battle going on between the resisting forces of the body and the various disease-producing organisms to which we are more or less always exposed, when these resisting powers are lowered, the invading hosts gain the ascendancy.

This is manifested first by a congested condition of the mucous membrane of the nose in which the excretory glands become engorged and close up, resulting in a dry condition of the entire mucous membrane of the nasal passages, soon followed by a more or less free discharge. This discharge is watery at first, and later becomes muco-purulent, and if not controlled this same condition is likely to spread into the bronchial tubes and into the lung substance itself.

In other words, the so-called common cold in the head prepares the soil in which other germs develop. Consequently if we are carriers of the germs of pneumonia, influenza or grippe, or even other diseases primarily affecting the nose and throat, such as scarlet fever, diphtheria, measles or whooping cough, we are very likely to fall victims to these diseases.

There is also the constitutional predisposition which is usually referred to as a rheumatic or gouty tendency, but which in reality is a lowered vitality due to absorption from the gastro-intestinal tract. This is usually due to faulty diet and insufficient and improper daily exercise or in other words, a physically subnormal body.

Q.—Is the common cold dangerous to life? That is, does it frequently prove serious? Why is it called a cold?

A.—The common cold is not in itself dangerous, and usually tends to a spontaneous recovery in from ten days to two weeks. The great danger, however, from this catarrhal condition in the nasal mucous membrane is that during these attacks the various organisms are usually present that give rise to the more serious complications such as bron-

chitis or pneumonia. Extension to the accessory sinuses from the nasal passage may occur as well as inflammation of the middle ear. In fact, in a large percentage of the cases of pneumonia and broncho-pneumonia, infection is conveyed down from the nasal mucous membrane following one of these attacks of acute cold or coryza.

It is also important to bear in mind that different diseases peculiar to childhood, such as measles, scarlet fever and whooping cough, begin with this congestion and inflammation of the mucous membrane of the nasal passage. Therefore, don't neglect the so-called cold. It has been called a cold because it usually occurs in cold weather.

Q.—What can we do to prevent, in a measure at least, contracting these diseases?

A.—The most important thing to do is to keep ourselves physically fit. These conditions of congestion and inflammation of the mucous membrane of the nasal passage that have been commonly referred to as a "cold" are so called because of the greater frequency of their occurrence during the cold weather and because the symptoms follow undue exposure to cold in the majority of cases. Therefore we should guard ourselves against this undue exposure, bearing in mind that a temperature that is perfectly safe and even most desirable while we are moving around and engaged in physical exercise would be altogether too low a temperature if our bodies were at rest.

We particularly emphasize the importance of keeping the feet properly protected against cold and wet. Furthermore, there is the danger of improper dressing during the cold weather. We have unfortunately acquired the habit of putting on heavier underwear during the winter. This is a decided error, inasmuch as we seem to have lost sight of the fact that while indoors our dwellings and public buildings are artificially heated and we are practically in a summer temperature. If we have put on heavier clothing, it means that our bodies are going to be bathed in perspiration more or less all the time. Then when exposed to a decidedly lower temperature, as, for instance, when we go out or when we chance to stand in a draft, the amount of heat lost is decidedly greater than that which the body is capable of producing, and results in a chilly sensation and a general lowering of our vitality and our powers of resistance. Our indoor clothing should not, as a rule, be heavier in the winter than in the summer. When we require the extra clothing is when we go out of the summer temperature of our rooms or dwellings or offices or warehouses, into the cold outdoor air. It is essential that the material used for underclothing be of a porous texture, preferably light woollen garments or linen mesh.

Then there is the important role played by our diet. It must be borne in mind that food constitutes the fuel and if it is not carefully selected and properly assimilated, it will not generate the necessary amount of heat during the winter season. It is important, therefore, that we recognize the difference necessary in our diet for the winter time from that which we have been accustomed to during the warm weather, and see to it that there is an ample supply of the heat-producing articles of diet.

In short, the violating of any of the laws of personal hygiene has a tendency at all times to lower the resisting powers of our bodies and thus predispose to cold. Overwork, either physical or mental, insufficient sleep, are both important predisposing causes, and should be guarded against whenever possible.

Again let us emphasize the necessity for keeping ourselves physically fit.

Q.—If we contract a cold, what can we do to shorten its course and prevent complications?

A.—Notwithstanding all the precautions that may be taken, we may, through oversusceptibility, fall victims to colds. If so, we will have to put forth every effort to counteract the conditions that have given rise

to the symptoms that we are suffering from in these catarrhal conditions of the nose and throat, which will be found in many cases to have been undue exposure to cold. To overcome this it is necessary to bring about an increased flow of blood to the skin, as rapidly as possible, and thereby lower the internal blood pressure. This can be best accomplished by a full hot bath, or a hot foot bath, say at a temperature of 100 to 115 degrees, followed by a hot drink, either hot lemonade or preferably hot milk, and a dose of relaxing medicine. Go to bed with plenty of covering and if necessary reinforced by hot-water bottles, until free perspiration is produced. Summon your physician forthwith. Do not lose sight of the fact that there is no such thing as a "simple cold." The so-called "common cold" is only too frequently the beginning of some serious condition. It is therefore imperative that we get it under control and remove the predisposing causes as rapidly as possible. You will be surprised at how much time you can save by recognizing these first danger signals of the so-called "common cold." Give up at once, take a hot bath, a dose of relaxing medicine, go to bed with plenty of covering, in a properly ventilated room, and stay there until your physician tells you that it is safe for you to leave your room.

As regards diet, eat moderately. The old-time doses of whiskey and quinine are fortunately relegated to the past, as they did, in the vast majority of cases, more harm than good.

Don't lose sight of the fact that when you are neglecting or disregarding the so-called "common cold" you may be neglecting the beginning of an attack of influenza or pneumonia, or if it be in children, you may be neglecting the preliminary symptoms of measles, scarlet fever or whooping cough. An acute cold in an infant is always serious. It spreads rapidly and if not got promptly under control soon extends to the bronchial tubes and lungs, resulting in broncho-pneumonia, which is a fatal disease in young children, especially during the first and second year, and in fact it is very frequently fatal during the first five or six years. Therefore, if your baby contracts a cold, consider that the condition is serious, and get medical advice at once.

The mother who has a cold should always wear a mask when nursing her baby, so as to prevent the possibility of any droplets coming in contact with the child.

Avoid working in an overheated room. 60 to 65 degrees is quite warm enough in a working room, particularly if you are engaged in any active work. For the office 65 to 68 degrees, providing there is the necessary amount of humidity—from 40 to 50 per cent.—is a desirable temperature and is quite warm enough, bearing in mind that with these conditions there must always be a movement in the air—a slight current. If this cannot be accomplished by open windows, then it will be necessary to have a fan going in order to keep the air constantly stirred up.

Avoid everyone that has a cold and do not lose sight of the fact that anyone sneezing or coughing, if they do not smother their sneeze or cough in a handkerchief, is throwing out germs that may gain access to your respiratory tract.

It is also advisable to avoid all public meetings if you have a cold or any symptoms of a cold. If you chance to be sitting near anyone who is sneezing and coughing, we would advise you to change your seat as soon as convenient. It is unpardonably selfish for anyone with a severe cold to attend any public gathering where they are forced to come closely in contact with others. In the first place, in going out they are doing themselves an injustice, and secondly, they are needlessly and unjustly exposing others to these dangers.

Under no consideration should anyone who is suffering from a cold be permitted to handle articles of diet that are going to be consumed without first being cooked or exposed to a temperature that would destroy any germs. Keep constantly in mind that the human hand is one of the most frequent channels through which these disease germs

are transmitted from one to another. As we have repeatedly said, one of the most important mottoes to be placed in any dwelling is: "Have you washed your hands?" in golden letters placed at the entrance to the dining room.

Q.—What do we understand by broncho-pneumonia and lobar-pneumonia and how are they contracted?

A.—Broncho-pneumonia is an inflammation of the mucous membrane of the bronchial tubes and of the entire bronchial walls of the smaller bronchi and air vesicles. It is primarily a disease of infancy and early childhood and secondarily may follow any of the communicable diseases or eruptive fevers. The mortality during the first year is extremely high, ranging from fifty to seventy per cent. Approximately seventy-five per cent. of all cases of pneumonia occur during the cold weather.

Pneumonia proper, or lobar-pneumonia, is an infection of the small bronchial tubes, involving the air vesicles and lung substances generally, producing more or less consolidation of the lung tissues.

These diseases are not by any means of recent discovery. They were well known to Hippocrates and to the older Greek physicians, and they have continued practically unabated right down through the centuries and have at all times been considered the most dreaded and fatal of all diseases.

Pneumonia in its various forms is a disease that, unfortunately, Departments of Health and those in the field of preventive medicine have not been able to cope with efficiently. There has as yet been no preventive discovered, no vaccine that will render us immune to the ravages of this disease, which, until recent years, ran a neck-to-neck place with tuberculosis in Toronto. Of late years it is rapidly gaining the ascendancy over the latter disease, which of course can be easily explained. There is no doubt that we are in a better position to control the ravages of tuberculosis than we formerly were, as is quite apparent from the fact that we have one of the lowest death rates from tuberculosis of any city of five hundred thousand population, or more, on the continent, and approximately one-half of what it was ten years ago. However, even tuberculosis still claims a number of our citizens every year, but that number seems comparatively small when placed alongside of that claimed by the various forms of pneumonia, as is apparent from the following table:

Deaths in Toronto from all forms of tuberculosis in 1922—235 or 45 per 100,000 population.

Deaths in Toronto from all forms of pneumonia, including broncho-pneumonia in 1922—575 or 109 per 100,000 population.

In other words, tuberculosis accounted for approximately four per cent. of all deaths in Toronto in 1922, and pneumonia and broncho-pneumonia approximately eleven per cent.

Obviously then these diseases are jeopardizing human life to a lamentable extent.

Q.—What can we do to protect ourselves against these diseases?

A.—In the first place, keep physically fit. Avoid all of those things that have a tendency to lower vitality or lower resistance, such as over-fatigue, unnecessary exposure to cold, improper food and improper assimilation of the food we eat. Take ample exercise in the open air. Live and work in properly ventilated homes and industries. Avoid as far as possible all over-crowded and improperly ventilated public halls.

Inasmuch as pneumonia and broncho-pneumonia are not infrequently preceded by other diseases, it is extremely important that we take all the precautions to safeguard ourselves against the contracting of any of the diseases that only too often so prepare the soil and lower the vitality of the individual that pneumonia when it comes, proves fatal in a large percentage of cases. For instance, pneumonia following scarlet fever,

diphtheria, erysipelas, smallpox, in small children, is not unusually fatal in 100 per cent. of cases, and in the case of measles and whooping cough, pneumonia is the most frequent cause of death.

Another disease that is frequently followed by pneumonia, is influenza or grippe.

Therefore, having in mind the frequency with which these diseases, that in themselves may be very simple and practically free from danger so far as life is concerned, are complicated or followed by pneumonia, which is lamentably fatal, take no chances for either yourselves or your children when suffering from any other disease, during the cold weather. Be sure that you are fully convalescent and are physically fit before you resume duties and expose yourself again to the possibilities of other infection.

Q.—Why is pneumonia more frequent in the cold weather and why so fatal?

A.—Pneumonia and broncho-pneumonia are more frequent in the cold weather on account of their being not infrequently preceded by coryza or the co-called common cold, or cold in the head, or by some other of the list of communicable diseases which are also more prevalent during the cold weather. This greater frequency of all of these diseases is largely due to the fact that people are thrown more closely in contact with each other and therefore those that are carriers of the germs of these diseases become a very much greater source of danger and a more frequent channel through which these disease germs are spread.

We frequently have the question asked, why is it if pneumonia is such a fatal disease, that we hear of so many, as high as 25 to 50 per cent. of the citizens, during the winter season, being carriers of the germs of pneumonia? The response to this is that there are four known groups or strains of pneumonia germs. Fortunately the one that is found most frequently in the mouths and throats of our citizens during the winter months belongs to the fourth group or strain, which is by all means the least fatal and the least dangerous, and therefore the least likely to produce pneumonia when gaining access to a new field. It must be borne in mind, however, that it is not unusual to find the germs of strains one, two and three present in the throat and nose of those who have been either in contact with a clinical case or with a carrier. These are all more or less virulent and usually result in a very high mortality, ranging all the way from 12 to 30 or 40 per cent., and in some outbreaks have shown as high as 60 per cent. mortality.

For these reasons, unfortunately, the only practical advice regarding efficient protection that we can offer is that one does all of those things essential to keeping oneself physically fit.

The large mortality in pneumonia proper and broncho-pneumonia is due to heart failure. In the case of pneumonia, with consolidation, the heart becomes handicapped in two ways. In the first place, it is called upon to do extra work forcing the blood in and through the consolidated or semi-consolidated portions of the lung, and at the same time the toxins that are generated by these germs have a decidedly degenerative influence on the muscle of the heart, very materially impairing its powers of contraction. These two handicaps in a large percentage of cases, unfortunately, prove too much and result in heart failure. This is very particularly true if the attack of pneumonia is secondary to some other disease that has already materially lowered the vitality and therefore lowered the general resisting powers.

These acute respiratory diseases are still responsible for over 10 per cent. of our entire mortality every year. Unfortunately there has been a slight increase during the past ten years. The control is largely in your own hands. Read this catechism carefully and try to profit by it.—*Health Bulletin.*

A New and Interesting Local Anaesthetic*

BY NORMAN BLACK, L.D.S.ENG.

CONSIDERABLE attention is being given to the question whether cocaine can be done without altogether, and therefore the addition of yet another drug to the quiverful of cocaine substitutes is not without some interest. None the less, so often has the perfect panacea for the ills and difficulties connected with local insensibility produced by hypodermic injection been proclaimed, that the announcement of the appearance of a new anæsthetic creates very little stir nowadays. Why? Some very valuable substitutes for cocaine have been introduced in the past, synthetic, less toxic, more stable, more easily sterilized. But, and it is a formidable "But," all without exception have been slower in action, and with the same quantity of the drug have produced a much less profound anæsthesia. This meant that although the substitute was less toxic, a much greater quantity of it was needed to produce a good anæsthesia than was required if cocaine were employed. As all local anæsthetics are poisons, this fact washes out much of the feeling of safety associated with synthetic anæsthetics.

Moreover, in recent years such wonderfully good results have been obtained with attenuated solutions of cocaine, without untoward effects, that the danger associated with its use has steadily receded in the minds of those who take a cool, detached point of view. Considering that the unqualified have for years been making wholesale use of proprietary anæsthetics consisting usually of 1 per cent. solutions of cocaine with adrenalin and antiseptics, and that the number of fatalities is practically nil, the danger of cocaine in weak solutions is surely exaggerated.

The weakness of the substitutes in being slower in action and less powerful becomes a great objection to their use, for it leaves only the claim that they are sterilizable by boiling (which of course cocaine is not) as a reason for employing them. Because a writer refuses to be blind to the manifest advantages of a drug which happens to have distinct drawbacks, and therefore detractors, he is apt to be stigmatized as biased in favor of it.

This is perhaps hardly fair, for if he be a careful observer he has found out the good and bad points of all the competitors, and having seen that at present none is perfect has weighed them up and cast his vote in favor of the one which offers most advantages.

Ideas and methods are ever changing, and new drugs are always coming up for consideration. The one fact that remains unchanged and patent is that the really progressive thinker and worker must

*Read at a meeting of the North of Scotland Branch, held at Inverness on September 29, 1923, and published by courtesy of The British Dental Journal.

not be fettered but must have a free choice of all the drugs that be, to do the best by his patients and steadily improve his own operative technique. If this argument be conceded, then the action of any body of men in seeking to deny to the dental profession the use of any drug they need, is against the best interests of the community. If cocaine (or any other drug) gives the best local anæsthetic results in the hands of any one operator he should be free to use it.

The corollary of this is, that if the drug in question is not essential—if the substitutes are as effective and safer—they will surely eliminate in time the use of the older drug.

This leads up to a consideration of the latest substitute for cocaine, butyn, or more correctly para-amino-benzoyl-gamma-di-n-butyl-amino-propional sulphate.

Butyn differs from all previously offered substitutes, in that—instead of basing its claim first on safety, then on sterilizability, and afterwards in a sort of apology, announcing that the anæsthetic effect is weaker and slower in producing effects—it is boldly introduced as a stronger anæsthetic than cocaine and quicker in action.

In addition, solutions of this drug are unaffected by boiling and a long series of experiments prove that in the higher animals, at any rate, the toxic effects are considerably less than is the case with cocaine. Of course it is a poor article that is not well spoken of in the advertisements, and extravagant claims such as these appear to be, excite in the minds of most careful inquirers a slight prejudice against the article described. Every really inquiring mind, however, would desire to know more of a drug which, if its claims are justifiable, would be so vitally important to the dental operator.

I was at any rate at once keenly and actively interested. The first mention of butyn of which I had heard was at a lecture on the efficacy of anæsthetics and antiseptics, given in the autumn of 1922. In discussing the drug later with the lecturer, it was found that little was known in this country of butyn, and that the lecturer knew nothing of its constitution and origin. The lecturer advised application to one of the leading firms of manufacturing chemists. The application was made, but all the information received was that butyn was prepared in the United States, and that the distributing agents in Great Britain were Messrs. Allen and Hanbury. In turn this firm was also written to, and they supplied a very small leaflet with infinitesimal information as to the dental uses of the drug.

The distributing house disclaimed any knowledge as to the origin or constitution of the preparation, but were able to supply it in a 2 per cent. solution in sealed ampoules. Now no careful operator would be willing to work on such insufficient information, so after an interval the writer appealed direct to Messrs. Abbott, the manufacturers, in Chicago, stating his wish to know more of their preparation and his

unwillingness to make any use of it without the fullest knowledge as to its manufacture, constitution, the experimental results obtained with it, and the necessary antidotes in the case of evil after-effects.

Messrs. Abbott replied most courteously and at length; furnishing all the necessary information, and considerable literature connected with the drug.

It transpires that the production of the drug is the outcome of a definite effort to produce a substitute for cocaine, at least equal in power and speed to the latter, but with greater dependability and safety. The manufacturers, who themselves already make novocain, have been impressed with the fact that up to now all substitutes, including those of their own manufacture, are inferior because of slowness of action, weakness, the necessity for using a relatively large quantity of the suprarenal product with the anæsthetic, and the danger of the production of a serious dermatitis. One can but admire the serious thoroughness with which this firm attacked the problem before them.

Their representative, Dr. E. H. Volwiler, collaborated with Professors Adams and Kamm, of the University of Illinois, in a deliberate effort to study all untried cocaine substitutes in the hope of finding one which was at least as effective as cocaine itself and which was without the undesirable attributes of those in use at the present. It was evidently a searching and thorough investigation, for they studied forty new chemical bodies having anæsthetic properties. These were gradually narrowed down to a short list and finally butyn alone was reserved as deserving further investigation.

These researches apparently began in 1918 and lasted three years. At the end of that time so satisfied were the investigators with the properties of the drug, that it was submitted to a considerable number of dental practitioners in all parts of the United States for clinical trial. These practitioners were kept continually supplied with the drug until their combined experience covered at least 10,000 dental operations. In the meantime the Council of the American Medical Association had appointed a special committee to investigate butyn. Their report appeared in the *Journal of the American Medical Association* for February 4, 1922, and without quoting the report *in extenso*, it is worth while noting:—

- (a) That they found butyn to be more powerful than cocaine.
- (b) That it is more rapid in action.
- (c) The effect of it is more prolonged.
- (d) As far as experience went it seemed less toxic in the dosage required, when used on the higher animals.
- (e) Solutions of it may be boiled without losing any anæsthetic efficiency.

I quote this, firstly, to show that independent investigations pro-

duced the same verdict, and, secondly, to show how thorough is the trial and investigation that butyn has been subjected to.

The clinical trial of the drug by practitioners and in dental colleges lasted over eighteen months, and brought several additional findings, whilst agreeing with those announced by the committee of the American Medical Association. The additional features were:—

That butyn was accompanied very rarely by any after-effect or systemic reaction. Such phenomena, when they did occur, passed off very quickly.

Healing was unusually rapid after the use of this drug, due to its non-irritating and mildly antiseptic action.

The anæsthesia produced by butyn was of unusual depth, especially when compared with that of novocain and other substitutes.

It appears that para-amino-benzoyl-gamma-di-n-butyl-amino-propional sulphate, to which, for convenience, the name butyn is applied, is a drug of the novocain group, prepared in the destructive distillation of coal tar.

All local anæsthetics are alkaline esters of aromatic acids, and, therefore, similar in chemical construction. The synthetic ones are credited with being non-habit forming, but this statement needs further proof. It is difficult to believe if cocaine were quite unobtainable that drug maniacs would not satisfy their cravings with some synthetic substitute.

A dipsomaniac will fall back on crude alcohol like methylated spirit, when denied his usual stimulant. None the less there is so marked a variation in local anæsthetics that they might be divided into two classes. One is composed of those which are rapidly destroyed and eliminated by the tissues, and, therefore, less harmful; and one which is much more slowly eliminated, and, therefore, more dangerous. To the first class belong novocain, butyn and other synthetics, and to the latter, cocaine and bolocain. This classification is justified by the fact that when a high sublethal dose of one of the drugs in the first group is injected into an animal, after a sudden drop in blood pressure, and possibly some convulsions, recovery is rapid.

In the case of one of the more dangerous group the recovery is slow and delayed. It seems, therefore, that for a satisfactory local anæsthetic some drug is required which, in contact with living tissue, is markedly unstable. Thus, in the first place, it will, through instability, liberate some part of itself to combine with the tissue elements, changing the chemical constitution of the tissue cell, and so, in the case of nerve tissue, inhibiting its function. This, however, is not the only desideratum, for, having accomplished so much, it must undergo further change, be broken down, liberated from its union with the tissues, and eliminated.

When Kamm, Adams and Volwiler first carried out their inves-

tigations, the salt experimented with was a hydrochloride, but inasmuch as the sulphate is so much more soluble and so much more readily eliminated, the later experiments, which resulted in the choice falling upon butyn, had to do with the sulphate. The experiments carried out by Neilson and Higgins to show the safety or otherwise of butyn were elaborately painstaking and thorough, and quite illuminating. The comparison of the drug throughout is with cocaine, which is taken as standard. Working with rats, rabbits, cats and dogs, they first established the minimal fatal dose per kilogram of body weight for cocaine and butyn. The test was then made with subcutaneous injection, intravenous injection, and orally. The M.F.D. was worked out in milligrams per kilogram of body weight, and cocaine, being taken as unity, a comparison of the M.F.D. gave a figure for butyn indicating its relative toxicity.

This sounds like producing a definite and concrete result, but one must remember first that experiments on animals are only a rough guide, an indication as to what we may expect as to the behavior of the drug when used on the human subject. And, secondly, that cocaine, the drug taken as standard, is variable in the extreme. The variability of cocaine is a curious and fascinating phenomenon.

Dixon, in his "Manual of Pharmacology," has shown that there is a definite relation between the dosage of cocaine capable of producing convulsions, and the amount of brain substance per weight of animal. In other words, the toxicity of cocaine increases as the brain development gets higher.

Little more than half the cocaine necessary to produce convulsions in a dog will be required to bring about the same condition in a higher ape. On the other hand, the M.F.D. of butyn per kilogram of body weight proves to be the same for the rabbit, cat, and dog. Synthetic anæsthetics as a whole are much less variable than cocaine; and butyn, by its consistency in this direction, shows itself progressively less toxic than cocaine the higher the brain development of the animal tested. Thus, in experimenets on rats butyn proved to be twice as toxic as cocaine. Tested on rabbits it was three and two-third times as toxic, but it manifested only equal toxicity when used on cats, and, in experiments on dogs, cocaine proved to be the more toxic drug. In man, therefore, where cocaine manifests its extreme toxicity, it is to be confidently expected that butyn will maintain its consistent standard, and so have sunk far below cocaine in toxicity. This is borne out by the fact that up to date there has been no fatality connected with the use of butyn, and that unpleasant after-effects are rare and evanescent. This, after extensive use, is valuable evidence, for, after all, it is clinical experience which is the final and real test to which all local anæsthetics must be put. Experiments on animals are merely the sieve which filters out those drugs which are not sufficiently promising to be tested clinically. The actual manner in

which a toxic local anæsthetic acts to endanger life is not a matter on which much light has been shed. However, Neilson and Higgins, in their experiments, took charts of the respiration and blood-pressure of the animals experimented on. The special value of this comes in when one comes to study the antidotes or detoxicators, which should be used to counteract ill effects. If we can see exactly what happens to the circulatory and respiratory systems in a fatal case, we shall know what drugs to employ to produce an opposite effect. It becomes abundantly clear that if a fatal result can be postponed in these cases, recovery is practically certain. Whatever delays death is likely to save life. The charts taken by Neilson and Higgins show the direct effect of the two drugs on respiration and circulation. Cocaine gave a considerable rise of blood-pressure of short duration, then a gradual and long-sustained fall, accompanied by convulsions, with a slow return to normal. The respiration was depressed and irregular. This took place when 1 C.C. of 1 per cent. solution was injected into a dog. The effect of butyn on the same dog was quite different, although the same quantity and strength of solution were injected. In the latter case there was a slight preliminary rise in blood-pressure, followed by an abrupt fall for about a minute, and immediately afterwards a sharp rise to normal. No convulsions, and relatively no disturbance of respiration. Other experiments on the same lines simply confirm the first.

An equal quantity and strength of butyn as of cocaine was always used, although it is claimed (and my own personal experience endorses this), that butyn is the more powerful anæsthetic. The keynote of all the results obtained from butyn is consistency. Obviously, any drug which will successfully combat the blood-pressure fall which accompanies poisoning by a local anæsthetic will be an ideal antidote. Such a one is pituitrin, the extract of the posterior lobe of the pituitary body. The further experiments of the two before-mentioned observers were attempts to discover a remedy which should not only prevent undesirable reaction from sublethal doses, but should prevent death from fatal doses. The use of pituitary solution appeared to be so much more promising than anything else that in the end it alone was subjected to further experiments in poisoning from cocaine and butyn. Bear in mind the M.F.D. had been previously ascertained for both drugs. The first fact demonstrated was that the finest results were obtained when the antidote was injected at the same time as the drug. Thus $3\frac{1}{2}$ C.C. of a 15 per cent. solution of butyn (half a gramme) were injected into a dog, together with 0.09 C.C. of a pituitary solution; there were no convulsions, and the patient recovered. Yet 1.3 C.C. of a 15 per cent. solution of butyn produced convulsions and death in twenty minutes in a rabbit, although it was injected with a 1 C.C. of pituitary solution at the onset of convulsions. None the less, the injection of pituitary solution

(especially intravenously) was found to stop convulsions and save life (even when injected at the cost of convulsions) in cases where the concentration of the solution was lower, or the dose was less. Hyoscine hydrobromide, atropine, hydrastinin, caffeine citrate, and epinephrin were all tried in the same way in experiments on rabbits, and all with some degree of success. Nothing, however, was anything like as efficacious as pituitrin injected intravenously. I will quote one more case which, I think, is well worth mention: A rabbit was injected with 2 C.C. of 8 per cent. butyn. At the onset of convulsions 1 C.C. of pituitrin was injected intravenously. Convulsions ceased immediately, and the animal recovered.

Pituitary solution was also found equally efficient in experimental cocaine poisoning, and, altogether, as is stated in the paper quoted from, its detoxicating action was far superior to that of other drugs. As long as it was injected before or with the fatal dose of butyn, there were no convulsions, and the animals all recovered. When the pituitrin was administered intravenously after the onset of convulsions following a fatal dose of butyn, it stopped the convulsions and saved the life of the animal. Moreover, when used for counteracting a high, but sublethal, dose of the anæsthetic, it eliminated all symptoms of poisoning. The failure to save life which I first mentioned was undoubtedly due to the delay in bringing the remedy into action, which was involved by making the pituitary injection subcutaneously instead of intravenously. Just a word as to the action of pituitrin, by which is understood extract of posterior lobe of the pituitary body physiologically standardized by determining its effect on the isolated uterus of the virgin guinea-pig. Its chief effect is that of stimulating nonstriated muscle fibre. It thus improves arterial tone and raises blood-pressure, especially when lowered by shock. It seems, in fact, to be inoperative on a normal heart and on normal blood-pressure, whilst its beneficial action on a failing heart and on blood-pressure lowered by shock is most marked. An intravenous injection of 1 C.C. in collapse influences blood-pressure favorably for a full hour without raising it to an abnormal extent. These facts show how its very potent and valuable effect in cases of poisoning by local anæsthetics is produced, and from observation it appears that it will prove the ideal antidote in all cases save those in which pregnancy or high blood-pressure is a factor. After this somewhat long preamble, let us now touch on the most practical and, therefore, perhaps the most appealing, side of the consideration of butyn, viz., one's own personal clinical experience.

I have been using the drug regularly for about three months in both hospital and private practice, and lately have been employing it to the exclusion of all other local anæsthetics. The specially noted features in its use in my hands are extreme rapidity of action, minute dosage, perfect results in cases where other drugs used previously

produced only partial success, deep anæsthesia, rapid healing, and no unpleasant after-effects. As an instance of its rapidity of action, I would say that in all infiltration and submucous injections, the anæsthesia is complete by the time the injection is made.

In nerve-blocking, anæsthesia is obtained in less than half the time required for novocain. With regard to minuteness of dosage, I can remember three succeeding cases in hospital practice being successfully anæsthetized out of a single cubic centimetre of 2 per cent. butyn. The first two cases were single extractions, and the last was the extraction of three teeth, and all five teeth were removed quite painlessly. With regard to the obtaining of perfect results where other drugs only produced a modified success, I am in the habit of using local anæsthesia always in the excavation of sensitive cavities and the devitalization of pulps. This gives one the opportunity of doing practically the same operation several times for the same patient on different occasions, and comparing the different experiences of the patient.

With butyn, in the case of two very nervous patients on whom the operation of pulp extirpation was done, I have had the satisfaction of hearing the patients' testimony that while on previous occasions with cocaine and novocain some discomfort was experienced, with butyn there was absolutely none. The absence of a post-operative pain or swelling, or, indeed, of any unpleasant after-effects has been a very pleasant feature of my experience with butyn. Indeed, I think I may say I have definitely noted that in extraction cases where butyn was used there was unusually quick and clean healing. The only form in which I could at first obtain the drug was in 2 per cent. solution in sealed ampoules, each containing 1 C.C. It was not long before I suspected that I was using a solution of greater strength than necessary. I then procured 1 gm. of the powdered drug and proceeded to have my own solution made up. Butyn is as readily soluble as cocaine hydrochloride, and its solutions can be prepared with the same ease, but it is incompatible with chlorides, Ringer's or normal saline solution cannot be used as a solvent.

To obtain an isotonic solution the makers recommend the use of crystals of pure sodium sulphate. This, being non-dehydrated, has a formula of $\text{Na}_2\text{SO}_4 + 10\text{H}_2\text{O}$, and should be used in the following quantities:—

When making 2 per cent. butyn solution use 41.2 gm. in each litre of distilled water.

When making 1 per cent. butyn solution use 47.3 gm. to the litre.

When making $\frac{1}{2}$ per cent. butyn solution 50.5 gm. to the litre.

The use of adrenalin was more of a problem, for the usual salt, being a chloride, it is incompatible with butyn. The makers recommend the addition of the adrenalin last of all to the otherwise completely prepared butyn solution; but this is not convenient in practice.

The makers are preparing compound tablets of butyn and epinephrin which can be dissolved and used at once when required. I had a synthetic adrenalin sulphate solution prepared, my formula being as follows:—

R Butyn 4·5 gr.
Sodii sulphate 21 gr.
Liquor adrenalin sulph. 7 min.
Aquæ distillat ad 1 oz.

The sodium sulphate is first dissolved in the water and filtered, the butyn and the adrenalin solution are then added, and the whole solution sterilized. This solution, although not of the same composition as the blood, has the same specific gravity and freezing point. This 1 per cent. solution I now use exclusively and continue to get most satisfactory results from it. I tried a solution of $\frac{1}{2}$ per cent. strength, but must admit I did not find it had sufficient anæsthetic power.

In conclusion, I should say I commenced the use of butyn with a slight bias against it. I think I have tried every substitute for cocaine which has been advocated for dental work, and have been slightly disappointed with the best of them. In my opinion, their much inferior anæsthetic power eclipsed all their virtues when compared with cocaine, and for a long time now I have been chiefly using a cocaine solution of slightly under 1 per cent., with adrenalin and preservatives. Being satisfied with this, one was difficult to convert to the use of a new drug, especially when under the impresion that the claims made for the newcomer were extravagant. Still, as long as one is keenly and actively interested in one's daily work, so long will one eagerly sift the claims of anything which promises to make that work more efficient, and whilst this attitude of mind may lead the seeker up many blind alleys, such disappointments are of no account if one finds once in a way something which really helps to raise the level of efficiency. As such a thing I strongly recommend butyn to all seekers after something better in local anæsthesia, whilst echoing the warning frankly uttered by the makers, "butyn in dental work is still experimental, and so should be used circumspectly."

LIMITATIONS OF THE FIXED BRIDGE.—Let us remember that a fixed bridge is usually the ideal restoration for a single missing tooth. It can be used to restore two missing teeth, but seldom, if ever, three in the bicuspid region. Often three, and sometimes four incisors can be replaced when the cuspids are included in the abutments. A single abutment should never be used except in the case of a missing lateral, and never then unless the cuspid can be used to receive the attachment. Two upper laterals can seldom support two missing centrals, and an upper third molar makes a very weak abutment.—*E. Bruce Clark, in Dental Cosmos.*

MULTUM IN PARVO

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HELPFUL PRACTICAL SUGGESTIONS FOR PUBLICATION, SENT IN BY MEMBERS OF THE PROFESSION, WILL BE APPRECIATED BY THIS DEPARTMENT

AMALGAM FILLINGS.—Do not use the same mix of amalgam for the whole of a large cavity, or the filling will be softer on the surface than beneath, thus inducing a shrinkage that will destroy the adoption of the filling to the cavity margin.

FINISHING AMALGAM FILLINGS.—After filling is trimmed and shaped to contour, burnish all over with warm (not hot) burnishers. The result will be surprising to those who have not already tried this method.—*Dental Surgeon.*

In the etiology of gastric and duodenal ulcer, the mouth must be considered as a source of infection, which when carried to the stomach may cause toxic erosion of the mucosa. Surgeons occasionally overlook this source of infection in their haste to examine the blood, the urine, make kidney functional tests, etc.—(*John B. Deane, M.D.*)

CARMICHAEL ATTACHMENT.—A Carmichael attachment on a short pointed cuspid, where you cannot get parallel grooves, or an inlay half crown on some of those lower bell-shaped bicuspids that have no lingual cusps, stays for a short time, and then the bridge comes loose. Try this one. Make up your bridge as though you thought it was going to stay, but, before you cement it on, with a small bud bur, drill a small hole through the back of the attachment or inlay you have your doubts about.

Place the bridge in the mouth. Then, with the same bur or one of the same size in your contra-angle hand piece, insert it in that hole, and sink a pit in the tooth, being careful not to go too close to the pulp. It need not be very deep. Take a gold wire the same size as that hole, insert it, and drive it home. You cannot pull that bridge off. Take out your wire. Cement your bridge on as usual, introducing cement into this hole, and pit with a smooth broach. Put in your wire, drive home with a few light taps, and after the cement hardens cut off the wire and polish to a smooth surface.—*T. T. Brand, D.D.S., in Dental Science Journal.*



Destroying My Letters

EVERY once in a while I get a virtuous streak and start to clean up my desk. If you have never seen that desk you have missed something. It is quite a large and generous desk—presented to me years ago by a friend—but it has never had room enough for me. The pigeon-holes are stuffed to suffocation, and flow out over the lid in immense heaps of letters on either side. To be sure I have my letter files, but they do not much appeal to me. I like to be able to reach out my hand and pick up a favorite letter without opening a file. There is only a little barren space in the middle of the desk for letter writing, so encroached upon that there is scarce room for the paper. I seldom use a typewriter if I can help it—it is too mechanical. Confusion? No, I can find anything on that desk in an instant. But of course it looks untidy to callers, and so I virtuously go at it to clear it.

I resolutely start in to destroy my letters, but I find it much like cutting off the head of a favorite chicken. I pick up one letter and find something in it of great importance, and it must be preserved, so it goes to the file. I select another, and it contains a generous burst of confidence from a friend—it is so human that it would be almost akin to murder to destroy it. Here is another with an appeal for help in a very difficult problem that requires considerable deliberation, and it must be preserved for future reference. This one is from a friend I have never seen, and it is one of many from the same friend—all so delightful, and entertaining, and interesting, and instructive that it would be like throwing away a piece of good literature. And I never like to do that.

Here is a letter that goes at once to the waste basket. In it there is a stricture on one of my friends by a man who is seeking to prejudice me against him, and I am not interested in letters of that kind. Curiously enough the next letter I pick up is a plea for charity on

behalf of a man who has been foolish enough to do something wrong, and an appeal for me to write the authorities about his case. I always read letters like that the second time. This one comes from an appreciative reader of one of my articles, and, of course, it would be ungracious to destroy that. Besides I have no desire to destroy it. In the pile there are numerous letters of this type, and I conclude that after all there are many dentists who read our periodical literature. The charge is frequently made that we are not a reading profession, but I have never been able to subscribe to that doctrine.

Here is an anonymous letter expressing the keenest solicitation for the welfare of my soul, and quoting me many passages of Scripture—which, by the way, I had learned by heart as a boy—probably before my unknown friend was born. I deeply appreciate such a letter, but there is no means of expressing my appreciation when I do not know to whom to write. I always deplore an anonymous letter, whether written to myself or to some one else. It does not speak of frankness or good faith.

I hold another letter in my hand containing some reflections on dentistry as a profession, and predicting that it is going to certain disintegration and disgrace—incidentally intimating that dentists are no better than they should be. This letter has been answered—I always answer letters like that at once, because I do not agree with them. I guess this letter goes in the basket. Here is one—ah, *this* is the kind of letter that I never like to destroy. It is from the mother of a boy who is attending college. I had written her that her boy was doing well, and that she might be proud of him. Well—the letter I got from that dear mother! You could not buy it with money. Blessed be the mothers. The next one is of a different type—it is from a broken-hearted father whose boy has gone wrong, and appealing to me to see if I can do something to save the boy. Oh! if the boys only knew the intense solicitation of the mothers and fathers—if they could realize to the full all that their conduct means, if every boy could read all my letters I am sure we would have better boys. Boys are not bad by choice—they just sometimes go wrong.

Here is a letter with a beautiful piece of poetry enclosed, another with a rich joke, another with an important bit of information (I have gained much of my education from my letters), another with a pressed flower from foreign climes, another with such precious terms of endearment from a member of the family who is absent, another from an individual of note who has said something encouraging to me, another in great bold sprawling letters running grotesquely crooked across the page and written laboriously by little cramped and loving fingers, seizing the pen with all their might (do you think I could ever destroy a letter like that?), another from some one going around the world, and giving me a most interesting account

of the trip, another from a cordial friend in Japan begging me to visit their country and accept their hospitality, another—and another—and another. I have made a brave attempt to destroy my letters, but I find that the heap is about as large as ever, and there it must remain—untidy as it is.

C. H. Johnson,

MIXING AMALGAMS.—When an alloy is amalgamated and the excess of mercury removed by squeezing, an unknown quantity of the constituents of the alloy is removed by the mercury, depending upon the solubility of the metals in mercury. To obtain the best results they should be mixed with a definite quantity of mercury, and under no conditions must excess of mercury be used.—*Dental Surgeon.*

ROOT CANAL TREATMENT.—Three years ago we asked the responsible member of a faculty of one of the strongest and best-equipped dental colleges in America: "How many pulpless teeth do you require each student to treat?" The answer: "Now we have come to the conclusion that root canal operations are, and should be, a thing of the past." Two years later the same question was asked at the same institution, and the following answer received: "We expect each student to treat and fill the roots of about six teeth. Our impression at this time is that the requirements will be greater each year."—(U. G. Rickert, D.D.S.—*Dental Science Journal.*)

Q.—What do you think is the cause of the warping of the plates?

A.—I think the warping of the plate is due first of all to the contraction of the cast in setting. It is also due to using bolts instead of springs on our flasks. Dr. Prothero has shown that enormous strain is produced on our flasks when we use bolts rather than springs and is one of the greatest causes of misfit plates.

I have seen laboratory men use large-size presses, with long levers on them, to close down their flasks, little realizing the great strain they were putting on them, actually bending the flask out of shape. The small flask presses, which can be put in boiling water and screwed down as the rubber softens, are the only kind to use. After the flask is closed to within about a millimeter, it is safe to put it in the spring; place it in the vulcanizer and when the rubber becomes thoroughly softened, the flask will close and no distortion of the cast will take place.—*Dental Cosmos.*

ORAL HEALTH

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TORONTO, MARCH, 1924

No. 3

EDITORIAL

Ontario Dental Convention

THE preliminary arrangements for this big dental gathering, commencing May 26th next, are almost completed. Looking at it from all angles, this meeting gives every promise of becoming a most notable convention.

Every item on the programme has been chosen with a view of assisting the ordinary practitioner to solve his daily problems.

Dr. C. N. Johnson, of Chicago, will discuss the important subject, "What teeth should be extracted, and what teeth should the dentist attempt to save?" Dr. Don Gallie, of the same city, will attempt to solve a problem that is worrying many dentists to-day: "How to build up a successful and ethical practice." This is a new subject on our Ontario programmes, and one many practitioners in Ontario will be extremely interested in. "Caries, the cause and prevention" will be discussed by Dr. Wallace Seccombe, Dean of the Royal College of Dental Surgeons. This lecture will be illustrated by a series of interesting lantern slides.

Dr. Thomas Cowling, editor of the "Compendium" in Oral Health, is engaged in preparing "An authoritative report on dentistry, as it is taught and practised to-day." This subject is also making its first appearance on our Ontario programme, and should

prove of real value at this period of so many uncertainties in dental practice.

The list of clinics to be presented covers a very wide field, including "Oral Surgery and Anesthesia," "Full Dentures," "Fixed and Removable Bridge Work," "Clasps," "Amalgam Fillings," "Orthodontia," "Care of Children's Teeth," "Porcelain Jacket Crowns," "Gold Inlays," "Periclasia," etc., etc.

The committee in charge of these clinics is endeavoring to so arrange them that every member can be reasonably assured of proper facilities for seeing those clinics in which he is more particularly interested.

To the Publicity Committee has been given the task of reaching every dentist in the province and telling him, item by item, just how much is being crowded into those four days of convention. If there is anything you have not heard about and want to know, write any of the officers, and you will receive a prompt and courteous reply.

The lighter and social features of the convention give promise of real interest. The Monday evening programme at the College, under the auspices of the Board of Directors, promises to be an outstanding feature of the convention. The daily luncheons, the Tuesday evening dinner dance, the class reunions, the golf tournament, and the renewing of old acquaintances, will altogether add relish to a programme that should materially assist the Ontario dentists in rendering better service to their patients.

Make your arrangements at once to be in Toronto, at the King Edward Hotel, May 26th-29th next. It will prove one of your most profitable investments of the whole year.

R. G. McL.

Preventive Dentistry One Hundred Years Ago

ELEAZAR PARMLY, in 1821, published an essay entitled "The disorders and treatment of the teeth." On its title page Parmly published the following quotation from John Hunter, the celebrated surgeon who lived from 1728 to 1793: "The diseases of the teeth, considered abstractedly, are indeed very simple; but, by the relations which they bear to the body in general, and to the parts with which they are immediately connected, they become extremely complicated."

Regarding preventive measures, Parmly said: "The brush and powders, which are the common means had recourse to, will never more than half perform this office, as they act only on the outer parts, and thus leave the interstices entirely untouched. Some tinctures may for a time give a whiteness to the enamel, but they are certain ultimately to injure its texture, and render it more liable to decay. In

short, it may be concluded, that in proportion as any dentifrice, paste, or lotion, whitens the enamel, its structure is injured or destroyed. The only means necessary to preserve its color is by removing whatever may collect around the teeth, and thus allow them to possess their natural whiteness and polish. The best method to effect this is with a brush and warm water; but, even when the teeth have been thus cleaned, the interstices are not cleared. This may be effected by passing between the teeth a thread of waxed silk, thereby to dislodge whatever may have collected on their sides.

“The means which have been pointed out for the prevention of disease will be found of much greater advantage to society at large than all that has been said respecting the treatment, and in concluding, I cannot too strongly urge the importance of this particular object.”

This statement by Parmly, written over one hundred years ago, makes the progress of dentistry along preventive lines during the past century appear very meagre indeed. In spite of present day knowledge of food and nutrition, and of the local causes of dental disease, how much more can the average practitioner tell his patient to-day than Parmly published in 1821?

It is the manifest duty of the dental profession to study the causes of the modern prevalency of dental disease and spare no effort to carry scientific dental knowledge to the people.

TO PRODUCE THE BEST RESULTS, AS FAR AS SURFACES ARE CONCERNED, WHEN CASTING INLAYS.—When using any of the good investments (or home-made), before coating the wax model, take a small quantity of the thin mix and place it in the palm of the left hand. Briskly rub it with the second finger of the right hand. This action will immediately reduce the coarseness to a minimum. Apply with a fine brush from which any moisture and air have been removed by squeezing. The remainder of the mix can then be poured about the wax model, taking care not to imprison air. Pour only on one side of the inlay.—(*A. B. A. Palmer, Sydney, in Dental Science Journal.*)

MIXING ZINC CEMENTS.—Zinc cements are in such common use that many dentists are careless in their manipulation. The sudden incorporation of cement powder and liquid causes heat, because the chemical union has been too sudden; consequently, the careful manufacturer insists upon a gradual incorporation of the powder with the liquid, the mass being thoroughly worked throughout.

If you can keep your head when all about you
Are losing theirs and blaming it on you;
If you can trust yourself when all men doubt you,
But make allowance for their doubting, too;
If you can wait and not be tired by waiting,
Or being lied about, don't deal in lies,
Or being hated don't give way to hating,
And yet don't look too good, nor talk too wise;
If you can dream—and not make dreams your master;
If you can think—and not make thoughts your aim;
If you can meet with triumph and disaster
And treat those two imposters just the same;
If you can bear to hear the truth you've spoken
Twisted by knaves to make a trap for fools,
Or watch the things you gave your life to broken,
And stoop to build 'em up with worn-out tools.

If you can make one heap of all your winnings
And risk it on one turn of pitch-and-toss,
And lose, and start again at your beginnings
And never breathe a word about your loss;
If you can force your heart and nerve and sinew
To serve your turn long after they are gone,
And so hold on when there is nothing in you
Except the Will which says to them: "Hold on!"
If you can talk with crowds and keep your virtue,
Or walk with kings—nor lose the common touch;
If neither foes nor loving friends can hurt you,
If all men count with you, but none too much;
If you can fill the unforgiving minute
With sixty seconds worth of distance run,
Yours is the Earth and everything that's in it,
And—what is more—you'll be a Man, my son!

—RUDYARD KIPLING



James Gregory O'Neill, D.D.S.

Port Arthur, Ontario

ORAL HEALTH

A JOURNAL THAT STANDS FOR THE "OUNCE OF PREVENTION," AS WELL AS THE "POUND OF CURE"

Vol. 14

TORONTO, APRIL, 1924

No. 4

Oral Anesthesia*

JAMES GREGORY O'NEILL, D.D.S., *Port Arthur.*

MR. Chairman and Members of the Winnipeg Dental Society:—
Allow me to express my appreciation of the kindly feelings of the members of this organization toward me, also an appreciation of the honor done me in inviting me here.

I have chosen this subject, mainly, for three reasons:

(1) I feel it is one of the biggest, and most important subjects that go to make up the various kinds of knowledge that the members of our profession must have at the present day.

(2) It has infinite possibilities and I know of no other subject that will arouse and sustain one's interest more than this very one; for the reason that it has to do with the biggest thing in dentistry—the entire elimination of pain during operations.

(3) To create a desire for this work in those who do not do it, and to further stimulate and try to help those who are doing it, to greater zeal and bigger efforts.

The importance of a thorough knowledge of surgical anatomy in nerve blocking injections is quite obvious. It is not sufficient to know only the approximate points of insertion and the direction of the needle. This would be empiricism and would leave the operator at sea in case of complications. The anesthetist should know exactly the position and relation of the various structures through which the needle must pass to reach its objective.

It is not my intention to try and confuse you with too minute a description of anatomy. I have endeavored in this paper to cull everything I possibly could and only give you the regions we must enter, nerves we must anesthetize, arteries and veins we must avoid and muscles which we should not invade. The work of the dental

*Read before the Winnipeg Dental Society, December 14th, 1923.

surgeon is confined solely to the oral cavity. But the mere knowledge of the structures of the oral cavity is not quite sufficient. While the actual insertions are made within the oral cavity, the progress of the needle in the various deep injections is beyond the limits of the mouth proper.

Deep injections are not difficult to do. It requires a little courage, a reasonable amount of stick-to-it-iveness and ordinary common "horse sense."

The writer has done over a thousand block operations, and it is felt with a very certain degree of success, without ever having seen one single injection done by any other operator. His first deep injection, done by another, was observed at the Mayo Clinic in Rochester, Minn., about two months ago. This is stated with no degree of egotism, but on the contrary to instill into all you men the confidence that you also can do these injections with just as much a degree of success as any one else, and thereby derive a great deal of satisfaction and happiness both for yourselves and your patients.

It is very obvious that we must know our anatomy if we are going to do deep injections. The more intimately one knows his anatomy the better equipped he will be. Yet if one has, what I shall term a good knowledge of the surgical anatomy, he will be able to carry on very nicely.

The fifth nerve is the one with which we have to deal, so for a few moments we will review the anatomy we did not take so seriously in the dissecting and lecture rooms.

This nerve takes its origin from the midbrain and enlarges into the Gasserion ganglion. There are two of these ganglions, located in the floor of the cranium near the median line, each ganglion taking care of one side of the face.

The Gasserion ganglion divides into three branches:

1. The first or ophthalmic division.
2. The second or maxillary division.
3. The third or mandibular division.

The first or ophthalmic division is the smallest branch of the three. The branches supply the structures within the eye, also the forehead and scalp. As far as our deep injections are concerned we do not need to interest ourselves very much with it.

The second division runs in a horizontal direction, while the third division assumes a vertical direction. This is quite in conformity with the structures each serves, namely: the second division innervates the upper teeth, while the third division drops down into the intratemporal region to enter the inferior dental canal, in order to innervate the lower teeth. The two divisions separate at the Gasserion, at almost right angles.

The general course of the superior maxillary nerve is as follows: it leaves the cranium by the foramen rotundum, crosses the narrow

pterygopalatine fossa, enters the infra-orbital canal on the floor of the orbit, and finally emerges on the face at the infra-orbital foramen; there it divides into three branches:

- (a) Nasal, serving the skin at the side of the nose.
- (b) Labial, serving the upper lip.
- (c) Inferior palpebral, serving the lower eyelid.

When we think of the nerve supply of the upper teeth, we must remember that they are served by two distinct nerve-loops—an outer and an inner. The outer nerve-loop serves the pulps of the teeth, the fine nerve filaments actually passing through the apical foramina into the pulp chambers. It also serves the buccal alveolar plate of the molar and bicuspid teeth, the facial plate of the anterior teeth and the periosteum and mucous membrane covering the outer alveolar plate. The inner nerve-loop has no connection with the pulps of the teeth. This loop innervates only the lingual or palatal alveolar plates of the upper teeth and their soft coverings, the periosteum and mucous membrane.

THE OUTER NERVE-LOOP.

Before the second division enters the infra-orbital canal and becomes the infra-orbital nerve, a branch is given off, the posterior superior alveolar nerve, which runs downwards along the zygomatic surface of the superior maxillary bone, enters the posterior superior alveolar canals, runs in a special canal in the substance of the zygomatic surface and is distributed by fine branches to the three upper molar teeth, the periosteum and a portion of the mucous membrane.

MIDDLE SUPERIOR ALVEOLAR NERVE.

As the infra-orbital nerve runs along the infra-orbital canal, at some point in it another branch is given off, the middle superior alveolar nerve. This nerve innervates the two bicuspid teeth, serving their pulp tissue, buccal alveolar plate, periosteum and mucous membrane.

ANTERIOR SUPERIOR ALVEOLAR NERVE.

Finally, just before the infra-orbital nerve comes out on the face at the infra-orbital foramen, about one-quarter of an inch posteriorly to the infra-orbital foramen, a third branch is given off, the anterior superior alveolar nerve. This nerve serves the central, lateral and cuspid teeth, their facial alveolar plate, periosteum and mucous membrane.

The three branches, before they enter the apical foramina of the teeth, form the superior dental plexus, from which fine filaments are given off and pass through the apical foramina; the middle superior alveolar anastomoses with the posterior superior alveolar, forming a small enlargement, the ganglion of Valentine. It also anastomoses

with the anterior superior alveolar, and forms a similar enlargement, the ganglion of Bochdalek. This explains the frequent failure to obtain anesthesia in the first upper molar tooth with a tuberosity injection. Although the posterior superior alveolar nerve is anesthetized, yet the middle superior alveolar, by anastomosis, may carry sensation to the first molar tooth, particularly its antero-buccal root.

The inner nerve-loop is derived from Meckel's ganglion, which is located in the pterygopalatine fossa, just below the second division.

A number of branches are given off from Meckel's ganglion, which are important from the standpoint of the anesthetist. These branches may be divided into four groups as to distribution:

- (a) The ascending branches. These pass to the orbit.
- (b) The posterior branches. These serve the upper part of the pharynx and the back part of the root of the nose.
- (c) The descending branches, which innervate the palate.
- (d) The internal branches, serving the nose.

The last two branches, namely, the descending and internal, form the inner loop, and therefore we shall consider them in detail.

The descending branches are three in number—the anterior, middle, and posterior palatine. The anterior enters the oral cavity at the posterior palatine foramen. It then runs, together with the artery, in a special groove formed at the junction of the palate and alveolar processes, as far as the cuspid tooth. The nerve innervates the hard palate, its periosteum and mucous membrane over the molar and bicuspid teeth. In the posterior palatine canal the inferior nasal branches are given off, which serve the inferior turbinated bone and the inferior and middle meatus of the nose.

The middle palatine nerve emerges from an accessory palatine foramen and innervates the soft palate, uvula and upper portion of the palate.

The posterior palatine nerve also emerges from an accessory palatine foramen. It runs backward to serve the uvula, soft palate and tonsils. The middle and posterior palatine nerves, together with a branch of the glossopharyngeal and the vagus, form the tonsillar plexus for the innervation of the tonsils.

The two naso-palatine nerves, which enter the nasal cavity through the sphenopalatine foramen, serve the palatal alveolar plate, periosteum and mucous membrane over the central, lateral and cuspid teeth on either side. The two naso-palatine nerves run as far as the cuspid teeth and here they anastomose with the anterior palatine nerves.

Thus, the inner nerve-loop of the upper teeth is mainly formed by two branches from Meckel's ganglion, the anterior palatine and the naso-palatine. It is important to remember the anastomosis of these two nerves at the region of the cuspids, so that the lingual plate

and mucous membrane of the cuspids are best anesthetized by infiltration anesthesia, instead of an incisive injection, because sensation is also carried by the naso-palatine nerve.

Veins Important in Conduction Anesthesia.—The dental surgeon is called upon to operate on a highly vascular area. It is a very difficult task to keep away from blood vessels in the various injections. Depositing the solution into the blood stream means increasing the toxicity of the injecting solution. Intravenous injections are productive of greater toxic manifestations than are intra-arterial, as the blood current in the former is toward the heart, while in the latter it is away from the heart. An artery is seldom, if ever, entered. The tunica media and propria are unusually thick, strong and elastic. A vein, however, may be entered with comparative ease, because of the thin, flabby venous walls. An injection into a vein is sixteen times as toxic, one into an artery four times, in comparison with subcutaneous injection. It is, therefore, of great importance to us to know those veins which the anesthetist may encounter in the various injections, and to know how to avoid them. The following veins are to be considered:

The pterygoid plexus of veins lies within the infratemporal and pterygopalatine fossa. It drains the blood from the oral cavity, the teeth, gums, and alveoli, orbit and pharynx. It communicates with the pharyngeal plexus on the medial surface of the internal pterygoid muscle and with the pharyngeal cavernous sinus through the foramen ovale above.

The plexus may be entered in a tuberosity and a posterior infra-orbital injection. The needle must be kept in close contact with the bony walls of the tuberosity and the zygomatic surface of the superior maxilla in these injections as much as possible, in order to avoid the external pterygoid muscle and the venous plexus which surrounds the muscle.

The posterior facial vein has been mentioned in connection with the parotid gland. It is formed by the superficial temporal veins just above the zygomatic arch. It then enters the parotid gland, slightly internally and posteriorly to the posterior border of the mandibular. There the internal maxillary vein joins the posterior facial vein, with the pterygoid plexus of veins. The plexus communicates by an anastomosing branch with the anterior facial vein. The posterior facial vein leaves the parotid gland below, at the lower border of the angle below, at the lower border of the angle of the ramus. Here it unites with the anterior facial vein to form the common facial vein.

The anterior facial vein commences as the angular vein at the medial commissure of the eyelid. It is formed by a junction of the supra-orbital and frontal veins. The facial vein then passes downward to the anterior border of the masseter muscle and, by a branch,

unites with the pterygoid plexus of veins. The anterior facial vein may be entered in an anterior infra-orbital injection.

Thus it will be seen that there is a direct communication of the veins draining the anterior and posterior part of the head. The injection in one vein may carry the solution to a distant part and there be manifested by a blanching or discoloration. For example, the solution injected into the pterygoid plexus of veins in a tuberosity injection may be carried to the anterior facial vein and cause a blanching of tissues in the infra-orbital region.

If we examine the internal surface of the ramus, we find the external pterygoid muscle attached to the inner two-thirds of the neck of the condyle, the temporal muscle attached and running down part way on the coronoid process, and lower down the internal pterygoid muscle is inserted into the lower portion of the inner surface of the ramus as high as the lingula, and the inferior dental foramen. In order to avoid this muscle, the needle must pass above the lingula. The area surrounding the mandibular sulcus is free from muscle attachment. This fact makes mandibular anesthesia possible.

Of the three principal salivary glands communicating with the oral cavity, the parotid is the one of greatest importance to the one doing conduction anesthesia, and its exact position and relation to surrounding structures should be carefully noted. The gland lies just below and in front of the ear, on the side of the face. It is located posteriorly to the ramus covering its posterior border and also the posterior border of the internal pterygoid and masseter muscles. It extends upward to the zygomatic arch and downward to the angle of the ramus. Two arm-like processes extend from the gland, one embraces the masseter muscle externally and the other projects on the internal surface of the internal pterygoid muscle. In the back the gland extends as far as the external auditory meatus and the mastoid process.

In intimate relation with the parotid gland are a number of blood vessels and nerves, which play an important part with post injection complications in mandibular anesthesia. These structures are as follows:

1. The external carotid artery and its two terminal branches—the internal maxillary and superficial temporal. The external carotid lies in a groove in the lower portion of the gland. It passes through the substance of the gland posteriorly to the neck of the condyle, where it divides into two terminal branches.

2. The posterior facial vein lies within the substance of the gland, slightly back of and internally to the posterior border of the ascending ramus. In a mandibular injection the vein is just in line with the direction of the needle, should it be advanced back past the posterior border of the ramus.

3. The facial nerve.—The nerve leaves the cranium by the stylo-mastoid foramen and enters the posterior part of the gland at about its middle. It then extends forward and laterally, dividing into its distributing branches within the gland. These branches supply the various muscles of the face with motor impulses.

Very often, in mandibular injections, the needle may be inserted too far posteriorly and the parotid gland be invaded. Two things may happen: the solution may either be deposited into the posterior facial vein and give rise to unpleasant toxic manifestations, or the facial nerve or some of its branches may be anesthetized. This latter may result in loss of motor control of some or all muscles of the face on the side where the injection was made. This condition is known as facial paralysis. There is, however, very little likelihood of entering the external carotid or internal maxillary arteries, which are also imbedded in the parotid gland, on account of the tough, fibrous, slippery muscle coat that surrounds all arteries.

THE POSTERIOR PALATINE INJECTION.

This injection gives *anesthesia* of the mucous membrane covering the posterior part of the palate, and the palatal part of the alveolar process.

The posterior palatine foramen is located 10 m.m. above the gingival margin on the palatal side of the upper 3rd molar, opening forward about five m.m. anterior to the junction of the soft and hard palates, and transmits the anterior palatine nerve. Very often the foramen can be detected by a slight depression in the dense mucous membrane above the teeth. There are no vital structures to be encountered in the path of the needle, from the time of the puncture until it reaches destination.

Technique of Injection.—The needle is inserted about 10 m.m. above the lingual gingival margin of the 3rd molar tooth from the opposite side of the mouth. After the mucous membrane is penetrated, the syringe is brought back to the same side of the injection, parallel to the alveolar plate and at an angle of 45 degrees with the occlusal plane of the upper teeth, then it is pushed onwards to the foramen, where one-half c.c. of the anesthetic is injected.

Area Anesthetized.—The lateral half of the posterior two-thirds of the palate, approximately from the cuspid back.

Undesirable symptoms often arise from this injection, owing to the fact that this nerve supplies the soft palate, and the patient gets an uncomfortable gagging and choking sensation.

In doing this injection, I have eliminated trying to enter the foramen for the reasons just quoted. About 10 to 15 m.m. is injected by infiltration as nearly as possible to the foramen, so that the solution may get into a groove near the foramen, in which lie the

anterior palatine nerve and artery. Just as complete anesthesia can be obtained in this way as trying to inject into the foramen, and all the undesirable symptoms are invariably absent.

Duration of Anesthesia—One hour.

ANTERIOR PALATINE INJECTION.

This foramen is located on the median line 10 m.m. posteriorly towards the palate from the upper central incisors and transmits the naso-palatine nerves. There is only one anterior palatine foramen, which is formed at the median line by the junction of the two superior maxillary bones.

Technique.—Insert the needle in the median line, directly behind the central incisors and just to the side of the large papilla. If the bone is followed, the needle will be conducted into the foramen. The needle should be kept parallel to the long axis of the anterior teeth. A few drops of the solution, about $\frac{1}{4}$ c.c., only are necessary to produce anesthesia.

Area Anesthetized.—The palatal gum and anterior part of hard palate as far back as the cuspids. Anesthesia occurs immediately after injection and lasts usually about one hour.

THE TUBEROSITY, THE ZYGOMATIC OR POSTERIOR SUPERIOR DENTAL.

By means of this injection, we anesthetize the posterior superior alveolar nerve as it enters the posterior superior alveolar foramen, located on the zygomatic surface of the superior maxilla. At times, there are several small foramina instead of one. We must remember that the surface of the bone is convex, and if we keep this in mind our pterygoid plexus of veins must be avoided in this injection.

Technique of Injection: Use a Smith No. 5 needle, as it is properly constructed for carrying out this injection with facility. The needle is inserted in the mucous fold near the apex of the distobuccal root of the upper 2nd molar, or 1st molar in child. Insert the needle straight up for about 10 m.m., always keeping the needle parallel with the alveolar plate and at an angle of about 45 degrees with the occlusal surfaces of the upper molar teeth; at this point resistance will be encountered, which is the buccinator muscle. Force the needle through this and then insert the needle backwards and inwards for a distance of 10 m.m., passing over the root apices of 3rd molar. At this point slowly deposit 2 c.c. of the solution. In all the distance from the initial insertion to the point that you should deposit the solution is between 20 and 25 m.m. It must be remembered that the point of the needle goes back and under the malar bone. The endeavor must be made to keep the needle in contact with the bone at all times, but do not engage the periosteum, otherwise the needle will bind. Anesthesia occurs in

ten minutes and usually lasts three-quarters to one hour. Symptoms are usually absent in this injection.

This injection will anesthetize the buccal mucous membrane, periosteum, external plate of bones and alveolus, including the pulps of the 3rd and 2nd molar, and 1st molar.

THE ANTERIOR INFRA-ORBITAL INJECTION.

The infra-orbital foramen faces downward and is located 10 m.m. below the infra-orbital ridge, directly below the pupil of the eye or better the centre of the orbit and above the second bicuspid. It must be remembered that the anterior superior alveolar canal originates, not at the infra-orbital foramen, but about 5 m.m. posteriorly; hence the solution must be deposited as closely as possible to the infra-orbital foramen. Two muscles must be avoided in this injection—the levator anguli oris and the levator labii superioris. If the needle is kept too close to the bone, the levator anguli oris muscle will be entered, and, if too far away from the bone, the levator labii superioris will be infiltrated. The needle should pass between these two muscles. In this injection we must be careful not to inject our solution into either the anterior facial vein or the infra-orbital.

Technique.—Establish an imaginary line between the centre of the orbit and running through the long axis of the 2nd bicuspid tooth. Palpate for the infra-orbital ridge and about 10 m.m. below the uppermost border of the infra-orbital ridge will be found the foramen. The bulb of the index finger is placed on the foramen and with the thumb the lip is raised. By exerting pressure, the patient can feel a distinct pain, if one has the right place. The syringe is held pen fashion and the needle is directed upwards on the imaginary line that has been established, and always allowing the syringe to rest on the lower lip of the patient. When the needle comes to the point of the infra-orbital foramen, inject the solution slowly, always holding the finger over the foramen, which helps to detect injecting solution and force it into the infra-orbital canal. Massage upwards after injection, to drive solution into the canal.

Symptoms.—The drooping of the upper lip on the side of the injection is invariably a symptom that the injection has been successful. It does not necessarily follow that if there is a numbness in the lip and on the side of the nose that we have anesthetized the branches of the anterior superior alveolar nerve. We can easily get these through the infiltration of the solution. There is a waiting period of about ten minutes before we get a good anesthesia and it usually lasts about three-quarters of an hour. Use about 1 to $1\frac{1}{2}$ c.c. of the solution.

A New Anterior Infra-orbital Injection is advocated by some authors and that is: Insert needle in mucous fold above lateral tooth.

Extend backwards, crossing the cuspid tooth at apex; follow bone to infra-orbital foramen.

POSTERIOR INFRA-ORBITAL OR SPHENO MAXILLARY INJECTION.

In a posterior infra-orbital injection, we endeavor to deposit the anesthetizing solution at the posterior termination of the infra-orbital canal, or where the second division enters the infra-orbital groove and becomes the infra-orbital nerve. In this manner the solution blocks the nerve at a point before the three branches supplying the upper teeth are given off, producing anesthesia of the entire maxilla on the side of the injection.

POSTERIOR INFRA-ORBITAL OR SPHENO MAXILLARY.

The examination of the course of the second division will show us that this nerve, after crossing the spheno-maxillary fossa, turns slightly externally to the infra-orbital fossa to reach the infra-orbital groove. It will be observed that the easiest route by which to reach the infra-orbital groove will be from a point on the zygomatic surface, which will clear the malar process.

Technique.—For this injection a 40 m.m. 21-gauge iridio platinum needle, mounted on a right angle attachment, is used.

The malar process is palpated, with the index finger, in order to determine the point of insertion of the needle, so as to clear this point. This place is usually above and between the roots of the 2nd molar tooth. Insert the needle in the reflection of the mucous membrane, slightly away from bone, advancing it superiorly and internally and endeavoring to be in contact with the zygomatic surface of the superior maxilla, until about 30 m.m. of the needle has disappeared into the tissues. Between 3 and 4 c.c. of a 2 per cent. solution are here slowly injected. The needle should be at a distinct angle internally toward the pterygopalatine fossa. The needle, and not the extension hub, should be at an angle of about 30 degrees, with a straight line drawn through the long axis of the upper and lower teeth. Sometimes in this injection the needle will encounter bony obstruction. Should the needle be directed too far posteriorly, and not kept in contact with the posterior surface of the superior maxilla, the external surface of the external pterygoid plate may be encountered and the external pterygoid muscle infiltrated, with a possibility of invading the pterygoid plexus of veins.

The part of the infra-temporal fossa through which the needle travels is devoid of important structures. There are no arteries or veins of any importance in this region, nor are there any muscles to be injected when the proper course is pursued. The internal maxillary artery is 20 m.m. from the proper path of the needle. The space through which the needle passes is filled with adipose tissue.

The dangers of the needle entering the orbit are to be discounted. In order to penetrate the spheno-maxillary fissure, it would be necessary to force the right angle attachment way back into the oral cavity, which is an impossibility.

Waiting Period.—Generally about 15 minutes, but the time is dependent on how close to the nerves the solution is deposited.

Symptoms of Anesthesia.—The symptoms are important, as they give an idea of the success of the injection and the extent of the anesthesia. If the infra-orbital region of the skin and half of the upper lip feels somewhat numb—it is a sign that the infra-orbital nerve and its dental branches have been successfully blocked. If the corresponding half of the nose and the palate feel numb, it is a sign of anesthesia of Meckel's ganglion and its branches. Anesthesia lasts from one to one and a half-hours.

Area Anesthetized.—The entire second division, including the pulps of the teeth, alveolar process, buccal and palatal mucous membrane as far as the median line; the antrum of Highmore, one-half the upper lip, side of the nose, lower eyelid and Meckel's ganglion.

THE MENTAL INJECTION.

This injection is not often used, as it has no special advantages and the same parts can be more easily and efficiently anesthetized by means of a mandibular injection. The foramen is variable and most difficult of access. The injection is used to anesthetize the mental nerve where it leaves the bone, as well as to produce anesthesia of the anterior part of the inferior alveolar nerve, supplying the incisor, cuspid and 1st bicuspid teeth.

Technique of Injection.—The mental foramen is found below the 2nd bicuspid tooth. Keeping the finger over the foramen, stand behind the patient and reflex the lip. Insert the needle in the mucous fold below the apex of 2nd bicuspid, the needle being kept parallel to the long axis of the root. The needle is inserted straight down about 10 m.m., until the point finds the mental foramen. Slowly deposit 2 c.c. of the solution. Remove the needle and massage. Anesthesia usually occurs in ten minutes and lasts about an hour.

THE LONG BUCCAL INJECTION.

This nerve enters the cheek buccal to the 3rd molar, drops down the cheek, supplying the buccinator muscle, and is inserted buccal to the lower 3rd molar, sending branches as far forward as the lower 1st molar and sometimes to the 1st bicuspid.

Technique of Injection.—The needle is inserted in the loose mucous fold, at the mesio-buccal root of the lower 2nd molar. Have patient close mouth sufficiently to relax muscles; then the cheek is retracted. With syringe held horizontally, the needle is inserted to

a depth of 20 m.m., keeping close to bone. Keep anesthetic ahead of needle. As the needle advances, a small amount of anesthetic is deposited. When $\frac{1}{2}$ to 1 c.c. has been injected, the needle is withdrawn and the mucous membrane massaged. This anesthetizes the mucous membrane on the buccal surface of the three molars and sometimes the bicuspid. Invariably this injection does not have to be resorted to, as in a well executed mandibular injection the long buccal nerve is mostly always anaesthetized.

PTERYGO-MANDIBULAR ANESTHESIA.

A study of the wide-open mouth is very helpful in making this injection. By placing the finger in the back part of the vestibule of the mouth, opposite and external to the last molar tooth, the anterior border of the masseter muscle and the anterior border of the ramus may be felt, the first one as a muscle band, and the last one as a hard, bony ridge, posterior to the former. Further backward and upward the finger will encounter the coronoid process, with the temporal muscle attachment. Still further internally and posteriorly the molar fold (pterygomandibular ligament) may be seen and felt. The fold corresponds to the anterior border of the internal pterygoid muscle, which may also be felt with the finger at the same time. Finally, still further back may be seen in the following order: the anterior pillars, tonsils, and posterior pillars. One can take a mirror and locate and examine these structures in his own mouth and establish their relation clearly in his own mind.

There is a depression formed on the ramus by the external and internal oblique lines. If a horizontal line is drawn from its deepest point, or its centre, across the inner surface of the ascending ramus, this line will generally come above the lingula and will cross the mandibular sulcus. These findings were arrived at by scientific research. In making a mandibular injection, this depression is sought and the needle is inserted at its deepest depression, so that when directed on that line it will reach the mandibular sulcus.

The width of the ramus should always be determined. The ramii are not always the same width. Place the index finger in the mouth of the patient on the anterior border or external oblique line, and the thumb on the posterior border of the ramus. The width of the ramus will enable the anesthetist to determine the approximate length of the insertion of the needle.

The third division of the trifacial or the mandibular nerve is the largest branch given off from the Gasserion ganglion. It takes its exit from the cranium through the foramen ovale and divides into three branches:

- (a) The long buccal.
- (b) The inferior dental.
- (c) The lingual.

The long buccal is given off just outside the foramen ovale. It passes forward through muscle tissue, crosses in front of the ramus, and enters the cheek muscle buccal to the upper 3rd molar, then passes directly down along the cheek and terminates into the mucous membrane buccal to the lower 3rd molar, sending off branches as far as the lower 1st molar, and in some cases to the lower bicuspid. It supplies the buccal membrane with sensation.

The inferior dental nerve passes down and outward into the inferior dental canal, terminating at the median line. It supplies the pulps of the teeth, the alveolar process, periosteum and mucous membrane on the buccal surface, except the buccal membrane of the molars, which is controlled by the long buccal nerve. At the median line it anastomoses with the nerve from the opposite side. Below the apex of the 2nd bicuspid the inferior dental nerve divides into the (a) mental nerve, (b) the incisive nerve.

The mental nerve branches outward through the mental canal and passes out of the mental foramen, which is halfway between the gum margin and the lower border of the mandible. The mental nerve supplies the chin, mucous membrane, periosteum and lower lip with sensation.

The incisive nerve, or the continuation of the inferior dental, terminates at the chin, through a series of small foramina located below the lateral tooth, and anastomoses at the median line with the nerve from the opposite side.

The Lingual Nerve follows the inferior dental nerve for a short distance, then gradually courses in front of the inferior dental foramen. It passes down about 5 m.m. from the internal oblique line of the ramus, turns forward in the mucous membrane in the lingual side of the lower teeth, anastomosing with the opposite nerve at the median line.

Technique of Injection.—The writer always uses a steel needle, 21 gauge, 42 m.m. in length, mounted on a short hub. I think platinum needles are absolutely contra-indicated in this injection. The needle is moved around more in this injection than any other of the deep injections, hence for this reason there is little likelihood of breaking a steel needle, while there is considerable danger of breaking a platinum needle. The new Solila Stainless Steel Needle, made in Schimmel design, answers the purpose excellently for this injection.

The operator stands in front of the patient and a little to the left. Holding the syringe in right hand in a pencil-like manner, we palpate the landmarks with the index finger of the left hand. The finger is placed in the patient's mouth between the buccal surfaces of the lower molar teeth and the cheek, and pushed gently backward, until the anterior border of the ascending ramus is felt. The muscle band of the anterior border of the masseter muscle here comes

into view, care being taken not to confuse it with the hard, long, bony ridge of the external oblique line, nor with the anterior border of the ramus. The bulb of the index finger is passed along the external oblique line until its depression is located; with the bulb in the depression, the palm of the palpating finger is turned externally, the radial side of the finger being parallel with the occlusal surfaces of the lower molars and bicuspid, but not resting against these teeth. Be sure to keep the finger parallel after locating the depression. There is danger of elevating or lowering it, and in this instance, if your guide is taken, then the injection made will either be too high or too low. More often it is too low. By resting the finger on the occlusal plane the anesthetist's view of the field of operation is unobstructed. In cases where the molars and bicuspid are in normal position and occlusion, the radial side of the index finger may be placed on a line parallel with the occlusal plane of those teeth, and the bulb of the finger resting upon the external oblique line may be used as a guide to the proper height for the insertion of the needle. The depression in the anterior border in such cases may be disregarded or used only as an additional landmark. The bulb of the index finger is placed on the external oblique line and not in the post molar fossa, nor on the internal oblique line. The mistake should not be made of placing the finger too far medially, thus covering the internal oblique line. This would prevent our striking bone with the needle. The needle is inserted at the centre of finger nail, striking bone. Either the internal oblique line or the post molar fossa may be encountered.

The syringe is held parallel to the teeth on the side of the injection. If the needle has been correctly inserted and bone encountered, the syringe and needle will be on a line with the buccal surface of the molars and bicuspid, for it will be found on that plane. The needle will be about 10 m.m. above the occlusal plane of the teeth in a normal case.

The needle strikes bone but for the fraction of a second. This is only to assure us that we are not entering too far forward toward the median line, in this manner engaging the internal pterygoid muscle. By maintaining the proper plane, namely, the centre of the finger nail, as it rests in the depression on the anterior border of the ramus, we are reasonably certain that the insertion of the internal pterygoid muscle will be cleared.

The needle is now disengaged from the periosteum, but not withdrawn and is advanced about 6 m.m., clearing the internal oblique line, yet holding the needle in lateral contact with the internal oblique line. This is very important. It is essential that we must stay hard by the internal oblique line, for sometimes after the initial puncture has been made, it is very easy to allow the needle to get away from it and insert it into the internal pterygoid muscle. If the

needle is not released from the periosteum, it will be held too tightly against the internal oblique line, thus interfering with the free movements of the syringe during the injection and sometimes a broken needle is the result. Occasionally considerable resistance to the needle may be experienced. This is due to temporal tendon, which in many cases may be inserted as low down as the last molar tooth. When these cases are met, sufficient force should be used to penetrate the tendon and proceed with the injection. The needle is now in the pterygomandibular space between the lingual nerve and the inner surface of the ascending ramus. About 8 to 10 minims of the solution are here injected to anesthetize the lingual nerve. This will anesthetize the lingual mucous membrane of the lower teeth. Quite frequently the long buccal nerve will be anesthetized by this injection also.

The inferior dental nerve remains to be anesthetized. It must be remembered the ascending ramus diverges externally from the body of the mandible. In order to avoid entering the internal pterygoid muscle and still keep the needle in the pterygomandibular space, the syringe at this point is swung to the opposite side, advancing the needle posteriorly and externally, endeavoring to keep the needle in close proximity to bone until the point of the needle gently encounters the posterior wall of the sulcus mandibularis.

The exact position of the syringe on the opposite side is of secondary consideration. The aim is to be in contact with the ascending ramus, so as to enter the mandibular sulcus and encounter its posterior wall. If we will retrospect for a moment on the anatomy of the ascending ramus, we cannot fail to note that if the needle is progressed above the lingula, in constant contact with bone, it must of necessity finally stop at the posterior boundary of the sulcus. When the needle is in contact with bone at this point, the remaining solution of the 2 c.c. syringe is slowly injected. Care should be exercised not to strike bone too repeatedly and forcefully, as this would tend to produce periosteal inflammation and more pain.

METHODS OF PRODUCING INFILTRATION ANESTHESIA.

- (1) Submucous, when the solution is injected beneath the mucous membrane.
- (2) Subperiosteal, when the solution is injected beneath the periosteum.
- (3) Peridental, when the solution is injected into the peridental membrane.
- (4) Interseptal, when the solution is injected into the interdental septum.
- (5) Intra-osseous, when the solution is injected, after perforating the outer alveolar plate.

Submucous Method.—When the anesthetic solution is injected beneath the mucous membrane, a wheal will frequently be formed. Submucous anesthesia is indicated in places where there are no bony structures to contend with, or in blocking the long buccal nerve in the buccinator muscle or when injecting the solution submucously over the teeth to be removed. Submucous injections are also used where it is necessary to anesthetize the mucous membrane only, or where it is not possible to inject the solution beneath the periosteum. The submucous injection is not indicated when absorption through bony structure is essential in order to produce the desired results, such as in the extraction of teeth. The solution, in order to reach the alveolus, must of necessity travel through the peridental membrane and then through the alveolar plate.

Subperiosteal Method.—In submucous injections there will be a tendency for the solution to be carried away from the point of injection by the lymphatics, so that a larger volume of solution is necessary to obtain proper anesthesia. When injected beneath the periosteum, the solution is confined by it to the alveolar plate. Absorption and surface tension is thus facilitated and less of the anesthetic solution is required.

For these injections use a needle 20 to 25 m.m. long, and about 23 gauge. The needle is inserted into the gum tissue midway between the gingiva and the approximate position of the apex of the tooth. The needle is inserted at right angles to the alveolar plate. Slight force is used in order to penetrate the periosteum. Deposit a few drops of the anesthetic solution before the position of the syringe is changed. The needle is then made parallel to the alveolar plate and forced beneath the periosteum toward the apex of the tooth, the bevel of the needle toward the bone. Keep injecting a slight amount of solution as the needle progresses to its objective. When the apex is reached, about 1 c.c. is slowly injected. The remaining solution in the syringe is deposited lingually in a similar manner, namely, beginning midway between the gum margin and the apex where the solution is deposited. It does not require as much solution to anesthetize the lingual as the buccal alveolar process.

The effectiveness of subperiosteal anesthesia will depend entirely upon the thickness and density of the alveolar plate and particularly its cortical layer. This varies in different parts of the alveolar process. It is thinner in the superior maxilla than in the mandible. For this reason, subperiosteal anesthesia is effective in the superior maxilla, especially so in the regions of the anterior and bicuspid teeth. In the upper molar teeth absorption takes a little longer. In the lower anterior teeth, absorption is fairly rapid, while in the lower bicuspids and molars, absorption is delayed and sometimes entirely prevented by the unusual thickness and density of the alveolar plate in that region.

The younger the patient the more effective will be the submucous

and subperiosteal injections. On the other hand, the older the patient, the slower will be the absorption of the solution and hence less effective. This is due to condensation of bone as the patient advances in life. Then again as the patient grows older the bone condenses, the various foramina become larger, and on this account nerve blocking injections are more effective in older people than in younger ones.

In the upper second and third molars, when injecting by the subperiosteal method, it is difficult to direct the needle parallel with the long axis of the teeth. The needle in such cases may be directed parallel with the occlusal surfaces of the teeth, inserting it beneath the periosteum in line with their apices.

I have used *Peridental, Intra-osseous and Interseptal Anesthesia*, but as submucous and subperiosteal are so much simpler and such good results can be obtained by them, I have discarded using the others entirely. For this reason I am not going to write anything on the technique of the injections. If a case presents itself tomorrow in our clinical material I shall only be too glad to demonstrate these injections to you.

Suppose we want to anesthetize a number of teeth in the maxilla. A 4 c.c. syringe with a 42 m.m. needle is used. If we want to anesthetize the upper bicuspid and molars, we make the point of insertion at the apex area of the cuspid tooth. Insert the needle below periosteum and deposit 1 c.c. of solution. The needle is held parallel with the occlusal surfaces of the teeth with the bevel toward the bone and directed posteriorly, endeavoring to keep it beneath the periosteum. When the apex of first bicuspid is reached, deposit another 1 c.c. of solution. The second bicuspid and the molars are anesthetized in the same manner. If the anterior teeth also are to be anesthetized, the needle is brought back to the original point of insertion, but not withdrawn, and is then directed over the root apices of the lateral and central teeth and the solution injected at the apices of each tooth. If necessary, the syringe may be refilled and the needle again inserted at the point of the previous puncture. In this manner, the entire outer alveolar plate, the peridental membrane and the pulps of the teeth may be anesthetized. The lingual plate and soft coverings must be anesthetized separately. This is best done by anterior and posterior palatine injection as it eliminates repeated punctures of the mucosa around each tooth. In this manner nearly all the upper teeth may be anesthetized without resorting to the infra-orbital or tuberosity injection. This method of producing anesthesia over a large area of the maxilla is a distinct advantage over injecting round each tooth separately, in that repeated punctures of the mucosa and therefore additional chances for injection and trauma are avoided, and also because less of the anesthetic solution is required. However, in such instances the writer prefers an infra-orbital and tuberosity injection. It is simpler, less of the solution is required and the results are more positive.

Infiltration Anesthesia in Six Anterior Lower Teeth.—The six lower anterior teeth may be anesthetized by depositing the solution into the incisive fossa. Stand behind the patient and put left hand round patient's head. The lip is retracted with the thumb and index finger. The needle is inserted at the median line into the reflection of the mucous membrane, as low as possible. At first the left incisive fossa is sought, directing the needle at an angle of 45 degrees between the syringe and the occlusal plane of the incisive teeth. The fossa will be found at a distance of 15 m.m. Sometimes the floor of the fossa may be encountered by the needle, 1 c.c. of a 2% solution is slowly injected. The needle is withdrawn to the original point of insertion, but not removed from the tissues and is directed to the right incisive fossa, maintaining the same 45 degree angle. When the right incisive fossa is located, another 1 c.c. of solution is injected. The bevel of the needle is directed toward the bone, endeavoring to keep it beneath the periosteum as much as possible. After completing the injections, massage the gums to force the solution into the small apertures of the incisive fossa.

To obtain lingual anesthesia, make two subperiosteal injections lingual to the central incisors, by depositing about 10 drops on each side. Make two more subperiosteal injections lingual of the cuspids, using the same amount of solution as in the injections for the centrals.

METHODS OF COMBATTING TOXIC EFFECTS.

On account of the rapid action of Novocain poisoning, it is necessary to size up the situation quickly. In cases of simple fainting, in which the cause is of an entirely different nature, we rarely have more serious symptoms than pallor, limpness and loss of consciousness. In severe conditions it is safer to assume that we have to deal with real toxic effects. Fortunately such accidents are extremely rare, but call for immediate action.

Before all, place the patient in a recumbent position. This is easily accomplished with the modern dental chair. It relieves the heart considerably. Loosen all tight clothing; direct the patient to breathe deeply, or if respiratory failure is evident, resort to artificial respiration at once. Sylvester's method is best employed. In mild cases aromatic spirits of ammonia (15 to 20 drops) may be administered with a small amount of water only to cause irritation of the mucous membrane. Camphorated validol is better still. It can be administered by dropping the proper dose (7 to 8 drops) on sugar. In serious cases hypodermic injections are given at once. Strychnine sulphate (1-30 gr.) may be administered and repeated after fifteen minutes and once again, later, if necessary. Strychnine sulphate is a cardiac stimulant. If the respiratory centre fails, atropine sulphate (1-120 to 1-60 gr.) should be given hypodermically. These drugs should be kept on hand in the so-called "Greeley Units" so that no

time is lost in preparing the solution. Ether given on a mask by the drop method and not excluding the air has a direct antidotal effect, as it is a directly acting, diffusible cardiac stimulant, stimulating the vasomotor as well as the respiratory centres. Just a few shakes of ether on the mask is usually enough to revive the patient.

A 1-6 gr. of morphia and 1-150 gr. of atropine can be given in separate hypodermic injections about twenty minutes before doing a block injection. The atropine is a heart stimulant and sedative while the morphine directly antidotes the toxic effects of the anesthesia solution that is injected. The writer has never done this as yet, and after doing many deep injections, has only had a few cases of simple fainting. But in cases where there is any doubt it would be well to resort to this pre-anesthetic treatment.

POINTS TO ALWAYS KEEP IN MIND.

- (1) Five m.m. equal about 3-16 inches.
Ten m.m. or 1 centimeter equal about 3-8 inches.
Twenty-five m.m. equal about 1 inch.
Thirty m.m. equal about 1 3-16 inches.
1 c.c. equals from 15 to 17 minims.
1 mil. equals 15 minims.
29.57 c.c. equal one ounce.
1 gram equals 15.432 grains.
64 milligrams equal 1 grain.
- (2) While injecting, to place your patient in a comfortable semi-reclining position, the chair should be at an angle of 45 degrees. After the injection the chair may be brought to any desired position.
- (3) Inject the solution slowly. The anesthetist should make it a general rule to take at least one minute for the injection of a 2 c.c. syringe of a 2% novocain solution. Not only will this procedure prevent the development of toxic manifestations, but it will also prevent traumatization of the tissue cells with which the injected solution comes in contact.
- (4) Be sure you do not inject into a vein. When the needle is in position and just before injecting the solution, pull the plunger slightly back. If a blood vessel is entered, the blood will rush into the syringe. If a vacuum is formed then you know you are clear of a vein. If the blood enters into the syringe, shift it to another position and aspirate again until no blood comes into the syringe, then inject the solution.
- (5) Alcohol in the syringe is often the cause of prolonged anesthesia after deep injections have been made.
- (6) Remember all the anastomoses of the nerves and vessels in the different injections.

- (7) Keeping everything absolutely sterile will eliminate many post operative complications.
- (8) Never use a light iridio-platinum needle in a mandibular injection. There is great danger of these needles breaking. Use a large gauge steel needle, never shorter than 42 m.m., and never lighter than 23 gauge.

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Full Denture Construction for the General Practitioner*

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(Continued from last issue.)

IMPRESSIONS.

I DOUBT very much if there is a bit of technic in all the work connected with full denture construction about which there is such a variance of opinion and such a wide variety of methods as is found in connection with impression taking. The profession is divided into two groups, one following the modeling-compound technic and advocating a certain amount of tissue compression, while the other believes in the soft-plaster technic, giving only a comfortable adaptation to the tissues in their normal rest and relaxed condition. Apparently the second group has made great gains over the first group in the past three or four years, and is unquestionably in the majority.

Credit undoubtedly belongs to Drs. Jacob and Peter Green for being the first to call the attention of the dental profession to the very definite need of a perfected technic in impression taking, and awakening an interest in this part of the work that was previously almost unknown. It is said that Dr. Jacob Green was so enthusiastic and had such faith in his method of impression taking that he sacrificed a good set of natural teeth in order that he might always have an edentulous mouth with which to demonstrate the virtues of his technic. How many dentists of to-day have a theory that they are willing to sup-

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port in such a positive manner? While the Green impression technic was more or less crude when compared with some of the later methods, nevertheless it served a very valuable purpose, namely, that of a stepping stone to greater things, and stimulated an interest that was necessary for proper advancement.

The Green impression technic was later markedly improved by Mr. Samuel Supplee, of New York City, who developed the "closed mouth impression technic" and what was known as the Green-Supplee impression technic. This method almost immediately became very popular, and with some additions and changes made by Dr. Russell Tench and others, is the standard modeling compound impression technic to-day.

When this technic is carefully followed sensational results can be obtained. Adaptation or "suction" can be secured such as was undreamed of by all previous methods. Patients whose mouth conditions are very unfavorable can be fitted with dentures that can be removed only with the greatest difficulty. Many clinics and post-graduate classes took up this technic. Many were quickly converted to this method, and it became one of the most popular impression technics in the country.

It was not long, however, until men began to have more or less trouble with cases where this technic was used. Dentures that were ideal so far as adaptation was concerned would be finished and delivered to a patient, but in from three to six weeks the patient would return with the adaptation entirely lost. Then it was that "post damming," "rerimming" and "rebasing" became necessary and popular. The cause of the trouble was that the excessively tight fit or close adaptation had sufficiently compressed the tissues underlying the denture to interfere with the venous and arterial blood flow, and nature had come to their relief. Resorption of these tissues was the result, and the adaptation was lost. The rerimming and rebasing treatment gave only temporary relief, and it was soon either a case of making over the dentures, or the patients tolerating a base with little or no adaptation. This was the rule.

However, there are a few men who use nothing but modeling compound for their impression taking, and the results they get are as good as the best; but it is because they have become so skilful in the manipulation of this material and understand so thoroughly its working qualities and the existing mouth conditions and how to treat them, that they avoid undue peripheral pressure or minimize it to such an extent that there is little or no after effect.

Modeling compound is spoken of as having three working stages: (a) hard, (b) molding, and (c) flowing. As a matter of fact, there should be only two, the (a) hard and the (b) molding. Modeling compound should be used at a temperature ranging between 140° F. and 160° F. and never above 180° F., for at this temperature it will

burn the patient and disintegrate the compound; but at this high temperature and in the extreme stages of the so-called "flowing state" it most certainly will displace soft tissue and muscle attachments and compress unduly soft tissue-bearing areas, thereby demonstrating that it is decidedly a "molding state" and not a free "flowing state."

Whenever any soft tissue of the human body is placed under a constant and abnormal pressure, this tissue undergoes a change just in proportion to the amount of pressure applied. When a modeling compound impression of the mouth is taken, and the soft tissues are unnaturally displaced or compressed, and the cast constructed is a perfect positive of the impression, then the dentures constructed over this cast must reproduce the compression produced by the impression, and the subsequent change in the soft tissues underlying this base will be in proportion to the amount of this compression.

SOFT PLASTER OF PARIS IMPRESSIONS.

Plaster of Paris has been used longer and possibly more extensively for impression taking than any other material. Its recognized advantage in securing all the fine lines and details of the mouth without displacement of the soft tissues has given it the front rank in this work. Its disadvantages, namely, the difficulty of getting it to place properly and keeping it in its proper place, and its tendency to expand upon setting, have all been more than over-balanced by its advantages.

The plaster of Paris-modeling compound combination impression helped materially to overcome most of these objections, and is to-day more or less successfully used by many dentists. The main disadvantage of this method was the lack of a plan to prevent the displacement of the peripheral tissues due to the excess of material used.

There are men who claim to have cast gold inlays in a disappearing mold before Dr. W. H. Taggart, of Chicago, gave his technic to the dental profession. There are also men who claim to have taken the modern plaster of Paris modeling-compound combination impression before Dr. Hall; nevertheless it remained for Dr. Rupert E. Hall, of Chicago, to present a complete technic for this work, and the technic for impression taking which I shall describe follows this so-called Hall method with the exception of a few minor details. The chief requisite of a perfect impression is that it shall reproduce in detail the negative of all the tissues in the mouth underlying the denture base in their normal and relaxed rest position. It is true that an impression of this kind will not, in the finished base, give the same sensational close adaptation as that secured by other methods, but it is just as efficient for masticating purposes, just as comfortable, and very much more permanent. The impression can be secured in much less time and the technic is very much more simple.

I believe that a big majority of the denture troubles due to tissue displacement are found around the borders of the base. There are three principal causes for this particular type of displacement: *one*, ill-fitting trays; *two*, excess of impression material; *three*, impression material in the improper working consistency.

* * * *

This displacement takes place in two directions, namely, upward and anteriorly. The characteristic complaints of the patient regarding the finished dentures constructed from impressions of this kind are that the upper denture drops in talking, that it makes the mouth sore around the borders of the base, or that it is "too high," and sometimes that it causes soreness extending up into the nose.

If the denture is "too high" the natural thing for the dentist to do is to cut it down. This he will promptly do with a vulcanite file or scraper. Such procedure will relieve the pressure and permit the tissues to fall back and assume their natural position, but the same time it creates a V-shaped space around the border and the adaptation is lost.

It will be well to remember this upward and outward displacement of tissues, because, in the impression technic to be described, this same condition will be produced, but it also will be *corrected* before it is allowed to be carried on to the cast. Displacement of soft and flabby ridge conditions will cause trouble in a similar manner, but this subject will be dealt with a little later.

(To be continued.)

Juvenile Jingles

The Little Germ

A little germ too small to see
Met Mr. Sandman, and said he,
"Is there a place where I can go?
I think you surely ought to know.

"Is there a place in all the town
Where windows never are let down,
All fastened tight and closed all day,
And closed at night so germs can stay?"

Good Mr Sandman shook his head,
"My children never go to bed
Without pure air: they'd be afraid.
They all have joined the 'Health Crusade'."

—Dora L. Cameron.

Canadian Dental Association, Vancouver, August 4-7, 1924

SPECIAL TOUR FROM TORONTO.

IN company with your Colleagues, a trip through the Prairie Provinces, Rocky Mountains, and a steamship trip from Prince Rupert to Vancouver should be very interesting and educative.

After leaving Edmonton we enter the foothills of the mountains and pass such famous places as Hell's Gate, Mount Robson, Mount Edith Cavell and Jasper Park. Here we will stop for a day and climb or travel by ponies along the beautiful mountain trails and enjoy the beauties of the great Canadian National Park.



S.S. Prince George.

We again start westward through the beautiful scenery, stopping at little Indian villages and have a close view of the Totem Poles, until we reach the City of Prince Rupert.

From here we travel by the Palace steamers of the C.N.R. to Vancouver.

The Journey through the "Inside Passage" has been aptly termed the "Norway of America." It is 550 miles and wholly within landlocked waters, with the exception of about 25 miles, the island to the west and the mainland to the east. For seascapes, island and mountain scenery in



Mount Erebus.

combination, there is no other part in the wide world that can provide so rich a treat.

On the journey we call at a number of towns to discharge freight and passengers; while staying we will have ample opportunity to visit

and inspect some of the large pulp mills, salmon fisheries, and saw mills. This makes the journey very interesting and gives one an opportunity of gaining knowledge of other pursuits and the great advantages of travel.

Any desirous of taking the trip this year should communicate with the Chairman of the Transportation Committee as early as possible, giving number in party, so that accommodation and reservations can be secured.

C. ANGUS KENNEDY, *Chairman.*
Physicians & Surgeons Bldg.,
86 Bloor St. W., Toronto.

W. B. AMY,
147 Bloor St. W., Toronto.

HOTEL RESERVATIONS.

In making your reservations for the coming meeting consult the hotel rate-sheet below.

Mail the order direct to the hotel you wish to patronize and a copy of the contract accepted by the hotel will be sent you along with baggage tags for your use.

	One in Room	Two in Room
Hotel Vancouver	\$4.00 and up;	\$6.00 and up
“ Grosvenor	1.50 “ “	3.00 “ “
“ Elysium	1.50 “ “	2.50 “ “
“ Castle	1.50 “ “	2.50 “ “
“ Angelus	1.50 “ “	2.50 “ “
“ St. Regis	1.50 “ “	2.50 “ “
“ Dinsmuir	1.50 “ “	2.50 “ “
“ Aleazar	1.50 “ “	2.50 “ “
“ Barron	1.50 “ “	3.00 “ “

P. H. VANDERVOORT,
402 Birk's Bldg., Vancouver, B.C.

The Causes and Treatment of High Blood Pressure

THE present interest in blood-pressure, says B. W. Fontaine (Southern Medical Jour.) may be attributed to the fact that the physician of today is more carefully studying his patients, that he is using his sphygmomanometer with more frequency, and that there is unquestionably a greater prevalence of the causes leading to the production of high blood-pressure.

While under ordinary conditions of health the blood-pressure may vary as the years advance, it is unusual for the healthy adult at any age to have a higher systolic pressure than 144 m.m. of mercury. It is not considered pathological, nor should it be defined as high blood-pressure, until the systolic pressure has risen to 160 m.m. of mercury, or higher. It is important to remember that the term high blood-

pressure means not only an abnormal rise in the systolic pressure, but always a relative rise in the diastolic pressure.

The consensus of opinion today is that there are two factors concerned in the production of high blood-pressure—an increased force of the heart-beat, represented by a rise in the systolic pressure, and an unusual degree of tonicity in the arteries and capillaries, represented by a rise in the diastolic pressure.

In estimating blood-pressure, the correct procedure is to place the patient in a sitting posture, or better, at rest in the recumbent position, for at least five minutes. The arm should be bare, the cuff a wide one, snugly adjusted. The instrument should preferably be one with a mercury manometer. The blood-pressure should be determined by the method of auscultation, the first phase denoting the systolic pressure, and the fourth phase the diastolic pressure. At least three readings should be made.

From reports of autopsies as well as experimental studies by Jane-way, Passier and Heinecke, showing that high blood-pressure can be produced in animals by a reduction of the kidney substance, he deduces an intimate association existing between high blood-pressure and disease of the kidneys.

In the early stages it may be very difficult to establish the existence of nephritis as the causative factor in a given case of hypertension. Kidney functional tests may be necessary, as well as a careful study of the blood chemistry, the latter showing to a greater or less degree the retention of nitrogenous products following suitable kidney test meals.

The presence of focal infections, especially when about the teeth, throat and paranasal sinuses, is an acknowledged factor sometimes in producing high blood-pressure. All other possible causes, especially diseases of the kidney, should be eliminated before the hypertension is laid to the presence of a focal infection.

Hyperthyroidism, especially the type due to the toxic adenoma, first described by Plummer, is usually accompanied by high blood-pressure. Here we have the possible influence of the excess of thyroid secretion in the blood and of some of the unknown toxic products which are retained in the body as a result of the thyroid gland dysfunction.

Traumatic hemorrhages into the brain, tumors of the brain and inflammation of the meninges quite frequently give rise to an elevation of blood-pressure, and, finally we must recognize the possible influence of heredity.

As cases of high blood-pressure usually come with the causative factors well established, we can hardly hope for a complete restoration of blood-pressure to the normal for the individual. He is sometimes able by the most active treatment to bring a very high blood-pressure below 200 m.m. of mercury. His usual result is to prevent

the fairly high pressure of 160-190 for the time being from becoming higher. He has never seen a case of prolonged hypertension brought back to the normal and maintained there by any method of treatment.

Prevention of high blood-pressure is the wise measure. Men and women who are approaching forty should pay special attention to excess weight, give a little less time to work, and more to recreation.

With ambulatory patients a reading of the blood-pressure at three week intervals is usually sufficient, the patient only being told the result in a general way.

It seems that there is not a general agreement of opinion as to the influence that the reduction of protein has in the treatment of hypertension. Much more important than protein restriction is the reduction of the total food intake to the minimum metabolic needs of the patient.

In dieting he endeavors to reduce his patients at the rate of one to three pounds a week on a diet of a total caloric value of not over 1,500. It should have a protein allowance of approximately .8 grain to one kilo of body weight, and there should also be a reduction in the amount of carbohydrates and fats, with an allowance for the vitamins in the shape of orange or grapefruit juice, or fresh fruit, butter and some sweet milk.

He suggests the following diet:

Breakfast.—One Orange, or one glass of orange juice, or one-half grapefruit with little sugar, or one-half canteloupe; one fried apple or two fried bananas; two or three slices of crisp bacon; one slice of buttered toast, or one beaten biscuit; very weak tea or coffee, with a tablespoonful of milk and one lump of sugar.

Luncheon.—Fruit only. One apple, or two bananas, or grapes, or one orange or one-half grape fruit.

Dinner.—One moderate serving of lean meat or fish; two well cooked vegetables, but no potatoes of either kind; a fruit or a vegetable salad; one corn meal muffin or one slice of buttered toast, or one beaten biscuit; no desserts except fruit, or one thin slice of sponge cake; very weak tea or coffee with one lump of sugar and one tablespoonful of milk.

This diet contains approximately 1,500 calories.

After a patient has been on a restricted diet until his weight is about normal for his age and height, and has maintained it at that level for five or six weeks, it appears that his weight becomes, in a measure, standardized. He may then carefully increase the quantity of each article of food at his breakfast and dinner, until his total intake is around 2,000-2,500 calories without taking on more weight.

Alcohol and tobacco should be absolutely prohibited. The cure of old focal infections, especially about the teeth, paranasal sinuses and tonsils should never be neglected.

In the treatment of severe cases with very high blood-pressure, rest in bed for from three to six weeks is very effective. Along with the rest cure a daily full hot bath of ten to fifteen minutes should be given.

The drug treatment is very limited. He suggests the use of whole ovarian extract, or corpus luteum for women at the menopause, thinks little of drugs of the nitrate class, except in emergencies, and believes the iodides might help in cases where syphilis is a causative factor.

CONCLUSIONS.

(1) Seventy per cent. of the cases of high blood-pressure are caused by definite diseases of the kidneys. Twenty-five per cent. belong to the class of vascular or essential hypertension, or hyperpiesis. The remaining 5 per cent. should include climacteric hypertension, the hypertension of toxic adenoma of the thyroid gland, brain lesions and focal infections.

(2) It is impossible by any method of treatment to reduce permanently to normal any prolonged high blood-pressure. A slight reduction in very high blood-pressure, and the prevention for the time being of moderately high blood-pressure from becoming higher, is all that can be accomplished.

(3) The treatment is essentially that of chronic nephritis, chiefly dietetic and hygienic; certain general measures, with a diet having for its object reduction in total calorie intake, with protein in an approximate ratio of .8 grain to one kilo of body weight.

(4) Drug treatment, save in a few instances, is of little value.

Dental Practice in a General Hospital*

BY S. HALLAM, L.D.S., R.C.S.Eng.

ON rising to deliver the twenty-seventh Presidential Address of this Society, I desire to express my appreciation of the honour you have conferred upon me in electing me your President and the pride I have in accepting that dignity.

This evening I do not propose to read a thesis on any one particular branch of dental practice, nor yet give a paper embodying research work. Although such was my original intention, time and the fates decreed otherwise; so the subject title was in the main decided by "chance," conjoined with the suggestion of one whose opinion I value highly. And so, gentlemen, I make my offering to Saint Apollonia and yourselves, pleading your indulgence for a none too facile pen and none too ready tongue.

Before dealing with the subject of hospital practice it is desirable

*Inaugural Address to the Liverpool and District Odontological Society, October, 1923, Dental Record.

to consider the patient, and a hospital patient is frequently a law unto himself besides which all else pales. One must remember he or she—I do not think that either sex can claim preponderance in numbers, although in weight the gentler sex would seem perhaps to hold the advantage—is generally ill as well as diseased—an important point accounting often for perversity; is commonly ignorant or of poor intellectual development, and in consequence has all the prejudices and fears of the unknown concomitant therewith, but withal has a capacity for appreciating benefits received and a gratitude that is boundless—occasionally expressed in widely different ways, varying from the tendering of a small coin of the realm, which could but be ill-afforded, to the quiet semi-audible “thank you” uttered by the poor soul who is travelling down the road which none return.

I little knew on making my application for the post of Honorary Dental Surgeon to the Royal Infirmary when I stated: “I would endeavor to the best of my ability to promote the welfare of the patients entrusted to my care,” how ignorant of human nature I was, nor yet how great a part it played in the achievement of a successful issue. So when a patient “declines treatment” my professional pride is not now so deeply wounded, for they know not one’s ability or lack of it; but my proper pride, if I may so distinguish it, is sorely hurt; and I cast round in my mind to discover wherein one has offended or dropped the brick which should have become the corner-stone of the building, and sometimes one is able to find it and recommence one’s labours.

After the patient, consideration turns to the surgery. I am fortunate inasmuch as a room is at my entire disposal where all patients fit to be moved from the wards are brought. Treatment is carried out there: dressings, scalings, minor anæsthetic cases, prosthetic cases, splints. For major anæsthetic cases I always use one of the theatres; those cases which are for examination and opinion, or are not conveniently moved, I see in the wards.

Then for assistants and assistance: First the house physician on duty on my visiting days attends me for anæsthetics and on my round—as I have read—the straws show the direction of the wind. I would mention that whereas originally dental mornings received their meed of cursings from those concerned, there is now more keenness for the duty and a wholesome desire to learn the art of administering anæsthetics for dental work, and to know more about dental disease in detail, and far fewer sweeping generalities. Staff nurse cares for my instruments and is sometimes assisted by a junior nurse. A junior nurse from the ward is responsible for the arrival from and safe return of the patient to the ward. For special cases—and by special I mean those cases presenting abnormal difficulty or risk—one of the honorary anæsthetists is available.

Having the patient, I almost said victim, the place wherein the

deed shall be done and the attendant satellites, one comes to the point, and for the purpose of this address I propose to make somewhat of a division of the cases into different groupings as follows:—

(1) Those for whom one is concerned with the relief of pain and for the immediate moment nothing beyond.

(2) Those cases wherein the dental condition is a recognized factor in the etiology of their general condition.

(3) Those cases in which the dental condition is a secondary factor, complication or sequel to the general disease.

(4) Those cases where treatment is needed as a sequel to or following dental treatment.

Then on the surgical side:—

(1) Primarily the treatment of sepsis in relation to infection.

(2) Preparation for operation either in the mouth or elsewhere.

(3) Treatment for operation.

(4) Treatment of injuries to jaws and surrounding tissues.

Coupled with these I would place those patients referred from the special departments.

In the first group are placed those who are suffering pain and whose general condition is such as does not permit of much being done, generally patients with cardiac disease and failing compensation. The loss of sleep engendered by an aching tooth, apart from the pain suffered, seriously militates against the physician's efforts to re-establish a working cardiac compensation. Accurate diagnosis is the prime essential for successful relief. Curiously enough the majority of these cases are due to pulp trouble, varying from a slight hyperæmia to a chronic congestion. Rarely do I see an acute alveolar abscess in these cases.

In the second group where the dental condition is an etiological factor in the general condition. In this group I place the toxæmic cases: rheumatoid, thyroid, splenic, choreic, gastric, general blood infections and anæmias. I do not propose to deal at length with the dental condition, but rather to indicate on what lines dental treatment is carried out to avoid any of the complications following treatment to which some of the diseases are liable to give rise. Briefly the dental conditions may be classified into:—

(1) Simple caries without pulp infection.

(2) Simple caries with pulp infection.

(3) Peridental infection.

(4) Occlusal insufficiency.

Generally the first type is rare *per se*. The remaining three types are seen together. The rheumatoid cases of dental origin are toxic primarily and, later, may have secondary infections; then whilst removal of the infected teeth is desirable at that period, it will not

accomplish the desired result. I treat these cases with respect. Until such time as I know that interference will not result in a general flare up, two, never more than three, teeth are removed, and cultures are made direct from the tooth socket. If there is any general reaction within thirty-six hours after the extractions, as evidenced by aggravation of rheumatoid pains, headache, rise of temperature, I stay my hand until an immunising dose of autogenous vaccine has been given, and then proceed.

Cases of enlarged thyroid, I frankly admit, always give me an anxious time, the chief risk being heart failure during or after operation.

Where the case is from the surgical wards and I am to remove without undue delay all the septic teeth, I choose as an anæsthetic ether and use the intro-tracheal method, an honorary anæsthetist attending for the purpose. Occasionally I have had rather persistent hæmorrhage to deal with following extraction; whether this is due to the anæsthetic raising the blood-pressure I do not know.

If the case is from the medical wards then I adopt a rather different line. First rest and quiet in bed until the pulse rate has become *steady*. If the honorary physician in whose care the patient is approves, a sedative is given on the morning I intend to extract the teeth and then I use a local anæsthetic—novocain 2 per cent.

For the choreic patient a complete anæsthesia is preferable, the choice of anæsthetic depending on the extent of the required extractions.

Cases of hæmophilia and other blood diseases demand care in technique, avoiding any laceration of the soft tissues, the complication being hæmorrhage, which is persistent and difficult to control. This applies also to those patients suffering from renal disease. The chronic renal case sometimes, in addition to post-operative hæmorrhage, becomes the victim of a troublesome and at times dangerous oedema of the soft tissues of the floor of the mouth.

In the gastric cases treatment is directed to the removal of septic teeth and instructions with regard to dentures, the main point in treatment to guard against being the avoidance of anything likely to set up vomiting post-anæsthetic swallowed blood or mucous.

In the general blood infections one has to remember the original site of infection may be infinitesimally small and bears no relation to the general state once general infection has taken place. Therefore remove all foci of which there is any doubt; but first, with the hope of directly neutralizing the circulating toxins, use an anti-toxic serum.

In the next group where the dental condition is a secondary factor or secondary manifestation, I place the infected granulomata, syphilis tubercle, actinomycosis, disease of some of the cranial nerves, tetanus, splenic lukæmia, and the special poisons such as lead, cadmium, and arsenic.

In the modern treatment of syphilis when the intravenous injection of arsenic preparations, compound or derivatives, is used together with mercury, ptyalism was extremely common until intramine was used. Now I rarely see a mercurial stomatitis. Primary oral tubercle is rare, but as a secondary manifestation to either pulmonary or laryngeal, tubercle is common in the late stages of the disease, I use lactic acid pure and have found it reasonably beneficial.

The other cases in this group fall within the category of impaired function, and treatment is aimed at immunising the result of stagnation and all its attendant consequences.

Tetanus spasm and risk of injury to the tongue, I think, is better treated by placing the end of a bandage between the teeth and so acting as a wedge; it seems to be less irksome to the patient than a gag.

Acute chronic lukæmia calls for special mention as the disease may show oral manifestations almost at the onset, the clinical picture resembling that of scurvy; and in the only case I have seen of lukæmia with this condition, extensive necrosis of the mandible and maxilla occurred.

The cases falling within the next group, which I would remind you is purely an arbitrary one arranged for our mutual convenience, are hæmorrhage and sepsis. Now of the latter I have seen remarkably few, of the former many.

Sepsis.—I treat on the ordinary lines—frequent lavage, mild antiseptics, to which I do not attach great importance; iodine, and drainage where necessary.

Hæmorrhage.—This complication following tooth extraction may be a minor sequel causing nothing more than annoyance at its occurrence, or progressively serious to the point of endangering life, or may even be fatal. In the treatment of hæmorrhage I would suggest one golden rule—*find* the bleeding point and then deal with it. Haphazard plugging of a socket, a roll clamped over a bleeding area, may arrest the bleeding, but more often is generally a futile remedy. In considering the treatment of hæmorrhage cases I propose, with your permission, to deal more systematically, and in this consideration I am including a type omitted from a previous group—I refer to the anæmias. In general hospital practice one has the enormous advantage of knowing beforehand which patient is likely to bleed, and one can accordingly take the necessary precaution of proper preparation, and so one divides one's scheme into preventive treatment and post-operative treatment.

PREVENTIVE TREATMENT (GENERAL).

Calcium lactate.—30 grains daily for three days previous to operation.

Serum.—Given hypodermically before operation.

Fibrin ferments.—Used actually at the time of operation and applied directly to the bleeding surface.

Blood transfusion.—Here I think it might be of interest to give a brief description of the technique employed, but before doing so, a brief explanation of the method of selecting suitable blood donors might be made. Human blood donors and recipients are classified into four groups: those falling within group (1) being known as universal recipients, that is to say, their blood stream and tissues will accept blood from either group (1) (2) (3) or (4). Group (4) are known as universal donors—blood from an individual in group (4) is suitable to any patient in group (1) (2) (3) or (4). Now it is from this group that all willing donors are drawn in general hospital practice, where a list of willing donors is always kept ready for use when occasion arises. The so-called grouping or division is determined by whether the donor's red blood corpuscles are agglutinated by a known standard serum. Groups (2) and (3) have their own peculiar affinities with which we need not concern ourselves. Now the operation of blood transfusion depends for its success on the group factor and the absolute prevention of clotting taking place in the withdrawn blood. The question of clotting is overcome by mixing a solution of sodium citrate with the blood immediately it is withdrawn. This end is most readily attained by using a small glass cannula which is inserted into the donor's vein. Opening into the cannula is a lesser tube whose diameter bears a definite ratio to the diameter of the cannula. Through the lesser tube is conveyed the citrate solution, so that the mixing of the two streams—blood and citrate solution—occurs at the point of withdrawal. The mixture is received into a vessel, the temperature of which is maintained at a point slightly higher than body temperature to compensate for the loss of heat in manipulation. The citrated blood is then transfused into the vein of the recipient previously selected for the purpose.

When dealing with hæmorrhage, one might use all the above together with additional aids:—

Firstly, mechanical means and pressure, if accurately applied, will always control hæmorrhage.

Styptics.—Turpentine, tannin, etc.

Thymus gland.—A 60 grain dose will often help.

Serum.—Hypodermically given 1 cc. of whole blood injected into the deep tissues intravenously.

Hæmoplastin.—Hæmoplastin, a proprietary preparation which, like serum, owes its merit to its action on the fibrin ferments.

Rest.—Quiet, all excitement or mental stimulation being avoided.

Morphia.—A small dose.

In treating hemorrhage one deals with the local wound and the general condition.

TREATMENT OF THE LOCAL WOUND.

First, total removal of faulty clot—occasionally in itself a line of action sufficient to arrest hæmorrhage.

Removal of any torn gum tissue, so that one makes the wound into a clean cut instead of a ragged wound.

Pressure.—Digital pressure is sometimes sufficient.

Packing.—A pack to be effective must completely fill the whole depth of the wound. A thin ribbon gauze I find the most useful for this purpose.

Styptics.—As such have their place. Although personally I rarely use them, one should mention turpentine which seems particularly effective in extensive capillary bleeding.

GENERAL TREATMENT.

This is aimed at increasing or altering the coagulability of the blood, and this object is attained by the various blood alteratives already mentioned.

ORAL HYGIENE.

A word on oral hygiene in reference to special cases.

In Syphilis.—Sulphur I often find extremely useful, but when mercurial stomatitis is present I still pin my faith, as far as local drugs are concerned, to potassium chlorate.

In the Typhoid Fever cases.—One must remember that typhoid bacilli occur with considerable frequency in the sputum; bacilli have been found (post mortem) in the tongue and tonsils; so one must remember that instruments used in the mouth of a typhoid patient must be placed directly into an efficient disinfecting solution and not laid down on any object before disinfection takes place, and so avoid contamination.

In Fevers.—Excessive mucous secretions becoming dried and mixed with food particles is the chief source of oral foetor. Normal saline diluted with hot water to which sodium citrate may be added, is an efficient cleanser. In cases of malignant disease of the mouth, strong disinfectants—to be effective they must be strong—are generally painful and ill borne by an already exhausted patient. The drugs I favor for this type of case are the following: formalin, hydrogen peroxide glycerine, borax, thymol. A caution in the use of hydrogen peroxide in any fixed appliance or where there is airway obstruction—a mouthful of mixed froth and foreign matter may be a serious menace to respiration.

In conclusion, gentlemen, I would wish to thank you for your patient hearing.

We judge ourselves by what we feel capable of doing, while others judge us by what we have already done.—*Longfellow.*

THE COMPENDIUM

This Department is Edited by
THOMAS COWLING, B.A., D.D.S., Toronto

A SYNOPSIS OF CURRENT LITERATURE RELATING
TO THE SCIENCE AND PRACTICE OF DENTISTRY

THE USE OF THE DRILL AS AN AID TO TOOTH EXTRACTION.

THE suggestion that a drill may be used in many cases of extraction, both as an aid in the removal of the tooth and as a means of hastening the healing process, is made by I. Clifford, L.D.S., London, England. The *modus operandi*, as published in the November, 1922, issue of the *Australian Journal of Dentistry*, is as follows:—

The labial plate, or buccal plate, of the alveolus is drilled away and then the forceps are applied in the opening so made.

First, with a strong lancet, the gum is cleared away from the tooth and the alveolus, then, with a large-size pointed, cross-cut fissure burr, from which the temper has been drawn (heating it to a dull red heat draws the temper and also sterilizes it), the bone is drilled away, the burr being kept close to the roots.

In the case of molars, it is well to make sure that the alveolus between the roots is severed; about five-eighths of an inch is the usual depth to drill. The reason for drawing the temper of the drill is to prevent it breaking when under lateral pressure particularly.

If an elevator is to be used, then a hole is drilled in the alveolus in exactly the position where the elevator is to be placed.

It is claimed for this method that the most fragile or strongest tooth can be extracted quite easily, as it makes no difference if the roots be curved or exostosed. There is far less bleeding than one would expect to find, and the removal of the alveolus is really an advantage, because, later on, it has to be either absorbed or exfoliated.

TUBERCULAR DISEASE.

TUBERCULAR disease of the jaw is rare in dental practice. When the cranial bones are affected, the orbital margins and molar processes are the usual sites. Tubercle more often leads to caries of the bone, with which there is little pain.



BRITISH COLUMBIA—A. T. OBERG, D.D.S.

825 Granville St., Vancouver

ALBERTA—JOHN W. CLAY, D.D.S.

914 Herald Bldg., Calgary

SASKATCHEWAN—C. W. PARKER, D.D.S.

Imperial Bank Bldg., Regina

MARITIME PROVINCES—STANLEY BAGNALL, D.D.S., Commodore Apts., Halifax, N.S.

MANITOBA—W. W. WRIGHT, D.D.S.

767 Warsaw Ave., Winnipeg

ONTARIO—Lieut.-Col. W. G. THOMPSON

28 King St. West, Hamilton

QUEBEC—ARCHIE N. JENKS, D.D.S.

121 Bishop St., Montreal, Que.

MARITIME PROVINCES.

THE regular meeting of the Halifax Dental Society was held on Feb. 19th. The paper of the evening was on "Evolution," by Prof. N. Gowanloch, of Dalhousie. Prof. Gowanloch gave a very interesting paper, well illustrated by slides. He gave an account of the different records we have for tracing the course of Evolution, taking the horse as one whose evolution through the ages has been well worked out. The discussion which arose after the paper dealt particularly with the change of the human bite from an end to end to its present form; also with the gradual disappearance of certain teeth from the masticatory apparatus of man, particularly the fourth molar, and the tendency for other teeth to be absent.

* * * *

Sydney, C.B., has taken another progressive step in the problem of the caring for the teeth of school children. Dr. S. D. Florian (Dal. '23) has been appointed as a part time School Dentist.

* * * *

The Halifax City Council have decided on a very decided course of retrenchment this year, and it is particularly gratifying in this respect to note that one of the very few appropriations to be increased is that for Dental Services to the school children.

* * * *

The annual meeting of the Nova Scotia Dental Association is to be held in Wolfville this summer, on July 15-16. This is the first time in a number of years that the meeting has been held outside of Halifax. A special attempt is to be made to have a very interesting meeting this summer, and it is hoped that a large number of the members of the Association will take this opportunity for a trip to the Annapolis Valley and attend the meetings of the Association.

* * * *

Dr. C. B. Climo has discovered a new kind of filling material. A patient who came in for treatment had one tooth which was much discolored, but appeared sound until it was examined carefully, when

it was found that the tooth had a cavity which was tightly packed with a substance which was found on examination to be ordinary chewing tobacco, compressed to almost the consistency of a filling material. The cavity presented a very small amount of decay under the tobacco. Other cavities in the amount presented the usual appearance of slowly progressing caries.

* * * *

Dr. M. C. Connors, of North Sydney, and Dr. Nana R. Warey, of Bridgetown, have moved to the United States to practice.

* * * *

Dr. Hazel A. Thompson has moved from New Germany to Bridgetown.

J. S. B.

MANITOBA.

AT the annual meeting of the Manitoba Dental Association, in January, the old members were re-elected to the Board. Dr. Croll is again President; J. F. Taylor, Vice-Pres.; H. J. Merkeley, Treas.-Registrar, and J. F. Morrison is Secretary. The main business consisted of the report of the Educational Committee, and passing a resolution to raise the annual dues from \$5.00 to \$10.00. The additional fund thereby created to be available for educational purposes.

Dr. Neil, specialist on difficult lower dentures, appeared before the Winnipeg Dental Society, on March 3rd, and conducted a class during the ensuing week. On March 8th, Dr. Bothwell of R.C.D.S., appeared before the Society on the subject of full upper and lower dentures, so the question of full dentures has received much attention recently.

The Educational Committee are having a series of health talks broadcasted through the medium of Manitoba Government Telephone Radio Station C.K.Y. The first lecture was given on Tuesday, Feb. 24th. The series consist of six lectures, one each Tuesday, 8.45 p.m. Winnipeg time, so they will continue until April 1st. Dentists who are radio fans should "tune in." The names of the speakers are not published or announced, but are introduced as "A Representative of Manitoba Dental Association." The following is a skeleton of the lectures, with the names of speakers.

RADIO LECTURES.

Introducing program, reasons, subjects, nights, etc.

Dr. Merkeley—The Mouth-Gateway to System, Temporary Teeth, Why Fix Children's Teeth. Permanent Teeth—6-year molar. The Cheek and Tongue—Orthodontia—Cause of Irregularities, best age to do it. Results of Neglect—decay, pyorrhea, appearance.

Dr. Morrison—Caries—Causes—What it is. Preventing Caries—cleanliness. Regular visits to the dentist.

Dr. J. F. Morrison—Diet.

Dr. Bier—Focal Infection—Gum Boils. Diagnosis and X-Ray. Importance of Theory Over Mechanics.

Dr. Wright—Restorations—Fillings. Artificial Dentures, Bridge Work.

Dr. Jackson—Pyorrhea—Causes, Prevention, Treatment. Facial Expression, Mastication.

Dr. E. W. Montgomery, a Past President of the Canadian Medical Association, appeared before the Winnipeg Dental Society in January and gave a very able address on "Focal Infection."

About thirty-five members of the C.A.D.C. attended the annual reunion held early in February in the Marlborough Hotel. Major J. F. Morrison is president for the ensuing year. Among the dentists present were:—D. P. Stratton, D. A. P. MacKay, Douglas Brown, Ken. Johnson, Earnie Kelly, Chas. Moore, Riley, W. A. Miles, Harold Jeffrey, J. F. Morrison, W. W. Wright, and G. H. Bray (Vice-Pres.), H. C. Hodgson, and R. J. Yeo.

The organization of "The Canadian Dental Hygiene Council" is a movement that should receive the whole-hearted support of all Canadian dentists, as it will constitute a central body to make possible the education of the public on oral hygiene on a much wider and more thorough scale than by local bodies alone. The Manitoba Educational Committee have received very valuable assistance from other provinces, particularly Ontario, but we have felt the need of an organization representing all Canada, from whom we would feel we had the right to ask and expect assistance, and the C.D.H.C. should fill this need.

Lastly, I just wish to add that some of our golf enthusiasts commenced the 1924 season March 1st and 2nd on the Norwood golf links. How's that for Manitoba?

W. W. W.

ALBERTA.

THE March meeting of the Lethbridge Dental Association took the form of a one-day clinic on full dentures.

Dr. H. A. Gilchrist, Professor of Prosthetic Dentistry at the University of Alberta, Dental Department, kindly gave his services for the day, and many dentists from the surrounding country and from Medicine Hat showed their appreciation and interest in the subject by closing their offices and coming to Lethbridge.

The morning and afternoon were taken up with Dr. Gilchrist demonstrating his technique, which is Dr. Hall's method modified, of full impressions, taking of bites, and arrangements of teeth on practical cases. In the evening, following a dinner to the guests, the Doctor read a paper on the same subject.

The members of the Lethbridge Dental Association feel greatly indebted to Dr. Gilchrist for his services, and also to the visiting dentists, who by their presence and interest helped to make the meeting a success.

J. W. C.



The Fight

IT would sometimes seem as if the whole of human life had resolved itself into a constant fight. From the cradle to the grave we are bombarded by adverse forces. Bacteria invade the innocence of babyhood, and chase us on down through life to the last lingering gasp of breath. Pitfalls are placed at every hand. We grapple with fire and flood, with wind and wave, with earthquake and volcano. We are frozen with the frost, and stricken down with the fierce heat of the sun. Wild animals seek to devour us, and tame ones sometimes trample us under foot.

Commerce is a continual battle—what we try to build up someone else tries to tear down. It is a constant climbing over each other's heads. Hawks live on hens, hens live on grasshoppers, and grasshoppers devastate the fields. All down the line one animal devours another animal till at last it comes to the bugs and beetles and insects that live on the products of the soil. Always in the final raid it comes to the soil—that great beneficent and universal mother of us all. Every bit of life and sustenance springs from Mother Nature. Every blade of grass has in it untold potentialities—and the blade of grass has to fight for its existence.

There is no living thing that does not have some ulterior influence working for its destruction—verily it is a “struggle for existence.” But out of this struggle comes growth and virility—it is not all destruction. We develop through opposition, if the opposition is not carried so far as to destroy us. Fighting the battles of life makes us stronger—to win a victory gives us courage to go on winning more victories. Even to get defeated at times may prove a benefit—to always win would not be good for us. To have no opposition is to deteriorate and become soft. The man who refuses to cope with the opposition of Nature, who shields himself from the tempests and storms of life, who declines to fight evil in any form, becomes a weak nonentity, and in the end the elements get him. To shun is not to escape.

Even Tolstoi's argument for non-resistance does not avail us here.

To shut ourselves up and say that we will not oppose anything is an impossibility. The forces of Nature seek out the farthest recluse and attack him, and if he does not defend himself, all the worse for him. He would better come out in the open, and fight like a man. Bacteria, so minute that they cannot be seen, enter every nook and corner, and there is no hiding away from them. They even invade the very food of man, and sometimes they kill him in that way. He would better arm himself against them.

But in all this fighting there should be one stipulation. Man is making his fight for existence, in contending against the forces of Nature, in conquering wild beasts and training tame ones, in his conflicts and differences with his fellow man—in all of this he should never allow himself to give way to anger. A display of temper at once puts a man at a disadvantage. The boxer who gets mad forgets his science, and is usually defeated. The football player places his team in jeopardy when he loses his head with passion. Anger is disintegrating in every way, and rends its victim like an inward claw. It demoralizes and incapacitates, and unfits a man for his best efforts. The hardest fight humanity has is to fight against anger. Then there is selfishness, one of the greatest sins of human kind—at the bottom of most of our dissensions. To contend against selfishness is one of the supreme duties of life—one of the outstanding virtues.

At bottom, the fundamental fight of all is the fight against ourselves—the continual contest with our baser instincts. He who has succeeded in conquering himself has attained a kingdom and achieved the greatest victory of life. To accomplish this is worth the most rigid course of training—the most constant discipline. With some men the process is a long, discouraging, and painful one, demanding of them all their resolution and energy, but no matter how hard and uphill the fight may be it should be attempted by every individual of responsibility and vision in the world, and he who fails to do this is remiss in one of the basic virtues of our existence.

C. H. Johnson

Announcement

THE Annual Convention of the Ontario Dental Society will be held at the King Edward Hotel, Toronto, May 26-29, 1924. An excellent programme has been arranged and a record attendance is assured.

FRED. J. CONBOY, *President.*

ORAL HEALTH

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EDITORIAL

Children's Clinic Established at Royal College of Dental Surgeons

THE ROYAL COLLEGE OF DENTAL SURGEONS has organized a special clinic at the College building, for the purpose of giving free dental treatment to the children of the poor. This clinic will be carried on quite separate from the regular College clinic, and will be limited to the two-hour period daily, from 8.30 a.m. to 10.30 a.m. It is expected that this clinic will treat approximately fifty under-privileged children every morning.

Special cards have been prepared for distribution by the Public Health nurses. These will be handed by the nurses to the children, to be taken home for signature by the parents, giving consent for dental work to be done.

A recent survey of the Separate Schools in the central area of the City of Toronto shows that of 2,272 pupils examined, 1,577, or 70 per cent., were found with dental disease. Many of these are junior grade children who have not been long enough in school to benefit from School Dental Service. Recent figures are not available, covering the dental conditions of pupils in the Public Schools of this area, but doubtless somewhat similar conditions prevail as in the Separate Schools. The service at the Dental College will be

for children of both Public and Separate Schools. The central area is being selected not only because of the special need, but also because of proximity to the College Building, thus avoiding unnecessary loss of school time.

The above survey shows that the regular school dentists require some assistance to cope with the prevalency of dental disease in the downtown sections, and the fullest co-operation is being arranged between the Dental College, the Department of Health, and the school authorities, for the purpose of improving the health conditions of many of the poorer children who are at present suffering from dental disease. The Director of Dental Services of the Board of Health will exercise general supervision over the clinic.

From the College standpoint, the School Children's Clinic will be of inestimable value in affording under-graduates an opportunity of becoming more familiar with the proper conduct of school dental clinics, and widen their experience in dealing with the dental problems of the young child.

The Golden Age

From H. G. Wells' "Short History of the World."

WHEN we look at all history as one process, as we have been doing in this book, when we see the steadfast upward struggle of life towards vision and control, then we see in their true proportions the hopes and dangers of the present time. As yet we are hardly in the earliest dawn of human greatness. But in the beauty of flower and sunset, in the happy and perfect movement of young animals and in the delight of ten thousand various landscapes, we have some intimations of what life can do for us, and in some few works of plastic and pictorial art, in some great music, in a few noble buildings and happy gardens, we have an intimation of what the human will can do with material possibilities. Can we doubt that in the future our race will more than realize our boldest imaginations, that it will achieve unity and peace, that it will live, the children of our blood and lives will live, in a world made more splendid and lovely than any palace or garden that we know, going on from strength to strength in an ever widening circle of adventure and achievement? What man has done, the little triumphs of his present state, and all the history we have told, form but the prelude to the things that man has got to do.

The great highroad of human welfare lies along the old highway of steadfast well-doing; and they who are the most persistent, and work in the truest spirit, will invariably be the most successful; success treads on the heels of every right effort.—S. Smiles.

ORAL HEALTH

A JOURNAL THAT STANDS FOR THE "OUNCE OF PREVENTION," AS WELL AS THE "POUND OF CURE"

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TORONTO, MAY, 1924

No. 5

Proceedings of Montreal Dental Club, 1923-24

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ADDRESSES BY:

KURT THOMA, D.M.D.; HARRY JOHNSTON, D.D.S.;
THOMAS HINMAN, D.D.S.

ROENTGEN INTERPRETATION AND THE RELATION OF FAULTY DIET TO DENTAL DISEASES.

KURT H. THOMA, D.M.D., BOSTON, MASS.

Assistant Professor of Oral Pathology, Harvard University,
January 15, 1924.

THE Roentgen method of examining the oral tissues and the accessory nasal sinuses has been proven to be of such great value that to-day no proficient diagnostician would depart from its use in routine examination. The patient is usually not aware of the disease, and the physician or dentist can only suspect diseases of the maxillæ when he finds teeth with large fillings, gold or porcelain crowns or discoloration.

COMPLETE EXAMINATION OF GREATEST IMPORTANCE.

When searching for infectious lesions to find the cause of some general systemic condition, it is of greatest importance to insist on a complete examination of all the teeth, and if any connected with the maxillary sinuses are infected, the nose with its accessory cavities should also be roentgenographed. To depart from a thorough routine examination often leads to regrettable oversights.

It is my firm belief that every new patient should have a routine Roentgen examination before any type of dental treatment is begun. It is also in the interest of the patients to return at certain intervals for a new Roentgen examination. It is surprising how dental caries starts in obscure places. The possibility of discovering a diseased condition before irreparable harm has been done, which sometimes even leads to the loss of the tooth, fully justifies this procedure. Many mistakes in treatment could be avoided by means of a Roentgen diagnosis. I can recall many cases of cysts which were treated for months by applying antiseptic dressings to the root canals or by pulp removal from perfectly normal teeth. In other cases the patients were put to great expense for beautifully constructed bridge work, which only a few weeks later was found to be attached to badly infected pulpless teeth. Equally superficial is the treatment of the maxillary sinuses without investigating the dental condition. If an infected tooth has caused the sinus infection, it should be found and removed, but even in cases of nasal origin, a tooth may become a contributory factor in preventing complete recovery and may give rise to a recurrence.

The value of Roentgen diagnosis depends upon correct interpretation of the picture, and such interpretation can only be made from a good roentgenogram. When reading a picture, however, one should not forget the history of the case and the clinical findings. The roentgenogram does not picture disease. It only records changes in the reliability of the tissues. These may have been brought about by pathological processes or by surgical and medicinal treatment. A Roentgen diagnosis is made by drawing deductions from the records made by the Roentgen examination, and the roentgenologist must become proficient in associating roentgen signs with corresponding diseased conditions. In a roentgenogram of a tooth, for example, the picture of the pulp is the same whether diseased or normal; but if a dark area indicating decay is shown in the crown of the tooth, one may suspect pulp disease; if there are symptoms or clinical evidence, the diagnosis is fairly certain. If the picture in addition to the above shows changes in the bone around the apex of the tooth, the roentgenologist can, and without clinical indications, draw conclusions which lead to the diagnosis of pulp disease.

PERIAPICAL INFECTION.

The scope of this paper will not allow me to discuss the pathology of periapical infections nor their relation to general health. I also omit the acute type of this disease, but before starting with a description of roentgen findings in chronic periapical infections, let me say a few words to further substantiate the fact that the radiolucent bone area around the root apex is not a circumscribed area, "a minor and harmless thing," as some writers still believe, but a dangerous source of infection. While experimenting with exposure time, milliamperage and angle of rays, I took sometimes a large number of pictures of one tooth, and found, in several instances, such teeth with radiolucent areas on the roentgen films developed very acute symptoms from nothing but repeated roentgen diagnosis. In chronic periapical infections the following conditions should be determined by roentgen diagnosis: (1) Shape of root should be known in case of root canal treatment as well as in case of extraction. (2) Condition of root canal, either well filled, partly filled, apex accessible or apex closed. (3) Condition of tissues at neck of tooth. (4) Condition of periapical tissues. (5) Condition of tooth apex.

KEEP THE ANATOMY IN MIND WHEN DIAGNOSING PERIAPICAL INFECTION.

The bone destruction at apex of tooth shows, as you know, as a dark area in the Roentgen negative, which is a picture of the radiolucent bone cavity. We may generally take the size of an abscessed area as an indication of the seriousness of the involvement of the surrounding tissues. There is an exception to be made, however, in the bicuspid and molar regions of the upper jaw, especially if the teeth protrude into the maxillary sinus. It should be borne in mind that when there is only a very thin film of bone over the roots of such teeth there is no chance for extensive bone destruction, and cases which show the smallest shadow are more liable to be the cause of sinus disease than larger areas separated from the antra.

Variations in the intensity of the picture of an abscess cavity have, to my mind, to do with its anatomical location. The defect in the bone consists, as is evidenced by examination of skulls, of a cavity due to bone destruction with osteoporosis of the surrounding bone. This decreases the resistance to the roentgen ray. The degree to which this is registered depends upon the location of the abscess cavity. If the outer or inner cortical plates of bone become perforated, we get a deeper shadow than from a cavity in the cancellous bone between the two thick, unaffected cortical plates of the mandible. Again, if the apex of the root is close to the surface, as is often the case with upper incisors, we may find that there is only a shallow

depression in the surface of the bone. This would give a very indistinct picture, and the structure of the underlying cancellous part of the bone could probably be distinctly seen in the area of the film.

The most important information which the Röntgen picture gives in cases of periapical infection is the condition of the tooth tissues at the apex of the root. A tooth which has been surrounded for a long time by an abscess becomes pus-soaked and forms an obnoxious foreign body, which can be best compared with a bone sequestrum. Microscopic examination shows that absorption takes place, which can be recognized in a good Röntgen film,—first, by an indistinct outline of the tooth, later by roughness and loss of tissue. Evidence of such absorption indicates that nature wants to dispose of this tooth. No antiseptic treatment can restore it to normal, and it is a case for surgical treatment. In cases of extraction, it is also important to find out whether the root of a tooth is enlarged, due to hypercementosis. Such teeth should be removed by the use of a different technique than that used in ordinary extractions.

THE RELATION OF DENTAL DISEASE TO DISEASE OF MAXILLARY SINUSES.

Infection of the maxillary sinuses is quite frequently of dental origin, and in many other cases diseased teeth become an important contributory cause. Chronic dental infection, such as occurs on pulpless teeth, is frequently the etiological factor. Chronic infection of the maxillary sinuses, with polypoid degeneration of the mucous membrane, often develops without the patient's knowledge, and is discovered only in routine examination. If, therefore, infection of the maxillary molars and bicuspid is diagnosed from the röntgen picture, sinus disease should always be considered as a possibility and röntgen pictures of the head should be taken for investigation. On the other hand in cases of sinus symptoms or sinus disease, röntgen investigation of the teeth should not be neglected before any treatment is begun.

It should also be remembered in connection with a probable dental cause that a small shadow around the root does not necessarily mean that the dental condition is negligible, because, in some cases, there is not enough bone between the sinus cavity and the alveolar socket to become destroyed, and formation of a large abscess cavity is impossible. Such a condition is more liable to cause sinus infection than a tooth with an extensive abscess cavity well removed from the floor of the sinus. This is well illustrated in my case. The pulp of the right maxillary bicuspid was removed several years ago on account of an exposure made by the dentist when preparing a tooth for a cohesive gold filling. About one year ago a röntgenogram was taken which showed a very slight periapical infection. The root canal was

treated experimentally by various modern methods and then filled under strict asepsis. A bridge was attached to the tooth and some time later it became slightly tender, until one morning a fullness and throbbing sensation was felt in the region of the right maxillary sinus when stepping hard. A small amount of gelatinous substance was discharged through the right nostril. An anterior-posterior roentgen picture taken the same day, showed that the right maxillary sinus was cloudy. On transillumination it was entirely dark. The tooth was extracted at once, and a probe passed into the alveolar socket showed that there was no opening through the floor of the antrum. No further treatment was resorted to; the symptoms disappeared, and after seven weeks the sinus was clear on transillumination and in the roentgen picture. Another picture, taken from Water's position a year later, showed that the maxillary sinus had remained normal. This case also teaches that it is not necessary for the dental infection to have direct communication with the cavity of the sinus. The infection may spread through the Haversian canals of the bone.

Dental cysts sometimes invade the maxillary sinuses.—Periodontal cysts, developing from the maxillary bicuspid or molars, or dentigerous cysts originating from misplaced tooth germs, often encroach upon the maxillary sinus. In three cases of periodontal cysts which I have observed, the lesion was so large that it filled the sinus cavity almost entirely. In all three there was a thin bony wall separating the remaining part of the sinus from the cyst cavity. The roentgen picture shows radiopaque tissue in the lower part of the maxillary sinus. This is nearly always separated from the normal part (which remains radiolucent) by a clear, well-defined light line, usually a segment of a circle. A dental film should be taken to show the relation to the teeth.

Importance of Early Roentgen Diagnosis.—Extensive lesions of the maxillæ, such as osteitis, osteomyelitis, and cysts, remain generally undiscovered for a long time. Not accompanied by any distinguishing symptoms pulpless teeth associated with them are, according to the histories of many cases, often treated for months by means of root canal medication without an accurate diagnosis such as could have been made by the use of the roentgen ray. The jaws, therefore, are frequently seriously involved when the patient finally consults a roentgenologist or oral surgeon. Every dentist should be familiar with the various types of bone infection and their clinical and roentgen aspects. The following are a few cases in which the true nature of the disease was not recognized in the beginning, because no roentgen examination was made.

Case of diffuse osteomyelitis.—The patient had had pain on the right side of the jaw for several weeks. He had had several teeth treated and afterwards extracted. There were very marked

constitutional symptoms and the patient was in bed for five days. When last seen by his dentist, extraction of the left mandibular third molar was advised. This was the only tooth remaining on that side. Examination showed swelling on the cheek and a fistula discharging pus into the mouth. The third molar was perfectly firm, but the incisors were tender on percussion. Temp. 100. Pulse good. No severe pain. Roëntgen examination of the jaw advised, which showed large pieces of bone separated by dark shadows, indicating extensive osteomyelitis of the mandible with several sequestra.

Case of cystic odontoma.—The patient, a boy of 16, had noticed a swelling under his upper lip for several months, the left maxillary lateral and central incisors being somewhat tender to touch. The dentist opened the lateral incisor, removed the pulp, and treated the pulp canal. Whenever the root canal dressing was removed a yellowish fluid escaped from the tooth. The root canal treatments failed to help the condition, and the gum was lanced several times without results. When the boy was first brought to me for consultation, a roëntgen picture was taken, from which a diagnosis of cystic odontoma was made. Note dark area with definite outline, indicating a cyst cavity in bone. The radiopaque substance in the centre of the cyst is an odontoma.

Case of pus discharge persisting after extraction of a tooth, the cause being an infected cyst.—In this case there was pus discharge from a fistula on the gum over right maxillary incisor. The central incisor had been extracted and a bridge constructed to replace tooth, but pus continued to discharge from the socket. A Roëntgen picture revealed a cystic cavity, partly connected with socket of the extracted tooth and the apex of the lateral incisor protruded into it. The discharge from the socket came from an infected cyst.

Case of extraction of teeth without diagnosing a large cyst.—The patient (Mrs. C. E. E.) complained of indefinable, dull pressure in right side of maxilla. At times she noticed discharge of pus on gum, which, when it occurred, relieved the pressure. Several teeth had been extracted at different times with only temporary relief. Examination showed a large swelling on entire right side of hard palate.

When the alveolar process was punctured, through the socket of one of the extracted teeth, a yellowish fluid was released. Roëntgen examination revealed a large cyst extending into the maxillary sinus and palate.

All these cases illustrate the great need of the roëntgen examination in diagnosis, and that a careful, systematic investigation is absolutely essential when treating surgical diseases of the jaws. The general practitioner who realizes this will see the advantage of making an appointment for examination first, when referring his patient

to the oral surgeon, which will also give the latter the opportunity to determine whether the case is suitable for the office or whether it should be taken to a hospital, and whether local or general anesthesia is advisable.

The Relation of Faulty Diet to Dental Diseases.—Faulty diet is one of the most important factors in the cause of dental diseases. Pulp diseases, periapical infection, even extensive bone infections and periodontal cysts can be traced back to dental caries, originating from dietary mistakes. A great many factors in our diet have a direct bearing on the teeth and their investing tissues. I need only remind you of the role easily fermentable carbohydrates play when in contact with the teeth, and recall to you the African researches of Dr. Stanley Colyer, of London, on the relation of sticky food to pyorrhea. You remember that he found that along the Upper Zambesi River, the Barotzi and related tribes suffer a great deal from pyorrhea, while others are virtually free from the disease. On careful study of the diet, it came to light that the Barotzi, Mweru and Bangwehlu natives use as their main food, cassava, a root which is dried, crushed and prepared until it becomes a stodgy, elastic and rather sticky mass. The natives free from pyorrhea did not possess this food. From these findings, Dr. Colyer makes the deduction that pyorrhea is caused from the sticky food remaining around the teeth and irritating the gums. He also believes that modern cooking produces foods of similar consistency, which, being gelatinous and adhesive, have a harmful effect when lodged between the teeth. This theory would also be supported by the fact that pyorrhea became rampant among the ancient Greeks and Romans simultaneously with the introduction of elaborate cooking and excessive feasting. Hot and freshly-baked bread and cake, and similar foods, form a whitish deposit around the teeth, which sticks to the gum margin and cannot be properly removed. Old dry bread made of a coarse flour will not adhere; as a matter of fact, it acts as a cleanser.

In addition to this local influence of food, we must also consider the systemic effects of faulty diet, with influence on their metabolism. We may here mention (1) lack of appetite for wholesome food because of the rich and concentrated food, such as sugar and sweetmeats. (2) Decreased calcium metabolism, either caused by the use of refined and prepared food (sugar, flour, peeled fruit, vegetables with the calcium salts removed and thrown away with the water in which they were boiled), or due to lack of vitamins, and their destruction in preparing the meals. (3) Unbalanced diet, caused by the craving for certain foods for the pleasure of their taste rather than the requirement of the body. This is, when connected with poor elimination and lack of exercise, frequently the cause of gingivitis, the initial stage of pyorrhea. In Rome, 1,600 years ago, both caries and

pyorrhea became rampant after new methods of cooking had been introduced when the Roman Army returned from Asia Minor. Cooking took a whimsical turn, and feasting became extremely sumptuous, banquets often starting at noon, and the guests would not leave the table before midnight. Celsus, the famous physician of his time, recognizing this fact, blamed the sad workings of a superior civilization as the cause of the decadence of health. While it is certain that dietary errors are the cause of dental diseases, it is also a fact that the harm done is more or less permanent. Our solution, therefore, lies in prevention. Prevention, however, means an educational campaign of magnitude, because a radical change must be effected in one of the most deeply-rooted habits of life, the habit of eating. People like to eat for sociability, for pleasure; custom also plays an important role, and changes are not easily effected. On the other hand, intelligent application of our knowledge of the influence of diet in the building of our bodies and maintenance of health, would lead to remarkable results. An example of the influence of diet on growth and development is furnished by the honey bee. The bees have for thousands of years aroused the admiration and interest of man. They have been cited by statesmen as having a model social system, with government by a single ruler, the Queen. Poets, philosophers and scientists, among whom may be mentioned Virgil, Aristotle and Pliny of the Greek and Roman period, and Raumer and Materlinck of more recent times, have eulogized the bees as unique among insects, and have spent years of their lives in studying them. There are three kinds of bees in a colony, the Queen, the workers and the drones. The drones are the males. The Queen is the true female of the hive. She is fully developed and resembles the workers, except for her larger size. The workers, which are undeveloped females, make up the principal part of the population, do all the work of the hive, rear and nurse the young, and gather the nectar and pollen in the fields. The bees can raise a new Queen at will from the same egg that might have become a worker, by means of a special diet which is fed to the larva when it hatches from the egg. The larvæ of the working bees for three days are given a milky food prepared from honey and pollen, partly digested. Afterwards, they receive pollen and honey undigested until the sixth day, when the cell is sealed. If a Queen bee is to be developed, the larva is fed on the very finest and most perfectly digested and concentrated food, called "royal jelly". She receives this during the entire period of her larvæ state ($5\frac{1}{2}$ days), and her cell before closed is filled with the precious mixture. The discovery that the bee can produce from a female egg either a working bee of comparatively small size, or a queen bee fully developed and larger, by different feeding, shows what an important part food plays in development of the young, and what

great results might be achieved if we should but apply the hidden truths of diet.

An adequate supply of mineral salts is imperative for normal growth, but just as important is the presence of the vitamins. At the Boston Health show, the exhibit of the Scientific Laboratory of the Ward Baking Company aroused a great deal of interest. They made feeding tests and exhibited animals of which from one litter some were fed on ordinary white bread, while others were fed either on bread made from whole wheat flour or bread called "vitovim" bread, made from white flour to which are added mineral salts and Vitamin B. solubles, extracted from germ and bran of whole wheat, and whole milk exclusively, instead of water. The tests show that white rats and white mice will grow normally both on whole wheat and vitovim bread, they were carried into the fifth grade of reproduction on either of these breads and water. On the other hand, old rats, fed ordinary white bread alone, will not reproduce, and young animals will lose weight and die within 60 days.

To insure the formation of well-developed jaws and strong teeth, prenatal influence is of great importance. It is true that certain substances, such as calcium salts and vitamins, may be taken from the stores of the mother's own body. This, however, can take place only to a limited extent and at a sacrifice of her own health. It is important, therefore, that the mother's diet should contain all the essentials for her own welfare and the normal development of the child. This means food rich in mineral salts and containing the vitamins necessary to the child's growth. It is evident that the quality of the mother's milk is influenced by her diet and that the supply of calcium salts and vitamins should be continued, as there is a great demand for these substances at this period of the child's life. If the mother's milk is poor, artificial feeding will bring very much better results if carried out under the advice of a competent pediatrician. The first permanent molars begin to erupt before birth, but the most important time for the formation of the enamel of the permanent set of teeth is between the time of birth and the age of ten. It should also be remembered that the enamel is formed from the inside out, and the enamel which is exposed to influence of the mouth is the last to calcify.

Milk, although not the natural food after the child is equipped with teeth to eat, is, nevertheless, a most desirable addition to the diet of the growing child, because it supplements whatever is deficient in the other foods. Its mineral contents are of great importance, and also the fact that it supplies all three vitamins. One should remember, however, that the Vitamin C. is only abundant in the milk of cows if they receive plenty of green food, and that in pasteurized, sterilized, or cooked milk, these same vitamins are to a large extent destroyed. It is necessary, therefore, to use with such milk, orange

juice or fresh vegetables which are rich in Vitamine C. Milk should be taken preferably at the close of a meal and not as a fluid in which to soak bread, crackers and other hard food, so as to render chewing unnecessary. Cod liver oil, a teaspoonful given twice a day, supplies the fat soluble Vitamin A, which is growth-producing, as well as the fourth vitamine, newly discovered by Dr. McCollum, which is said to have a special influence on calcification.

Bread is, next to milk, perhaps the most popular food. That made of white patent flour is deficient in vitamins and mineral salts and should be avoided if bread forms a large part of the diet. Whole wheat and rye bread and whole corn bread are recommended instead, as they contain all the ingredients of the cereal. If one cannot obtain genuine whole wheat flour, one can, for a few dollars, buy a small grinding machine and make his own flour. Many people do not realize that corn, like wheat, has an outer skin which contains the outer substances for growth and maintenance of life, and that this is lost during the process of refining. While it is impossible to accomplish a great deal after the teeth have been formed, it should be our duty to protect our children from the same mistakes to which we have fallen heir. The great tendency is to like throughout life food we have been given when young, and if we start children on wholesome food, dietary habits will correct themselves. My young son, who has been brought up to eat food without applying sugar at the table, dislikes very much to eat sweetened things; he will leave any dessert for a fresh apple or fruits in season. Let us stimulate interest in our patients for the application of this new development in preventive dentistry in order to produce sound teeth in the coming generation.

The Chairman called upon Dr. McCallum, Professor of Bio-Chemistry at McGill University, Montreal, to say a few words:

DR. MCCALLUM: Mr. Chairman, Dr. Thoma, and Members of the Club: I have arrived at those years of life when one gets to be very cautious in expressing opinions, especially on subjects which have become common knowledge, and on which everybody has an opinion.

To-night I feel that I am here more or less as an authority on the subject. While the speaker referred to me as an authority, I do not pose as one, and would hesitate to speak as an expert on the subject. I think, however, he has confused me with a namesake, E. V. McCollum; there is also my son, who has done a great deal of work on the subject, and is Chairman of the Committee of the Research Council of Canada, engaged in that work. Dr. Benson, a member of the Committee, is directing the investigation.

It is curious that there are something like 3,000 scientific papers on the subject of Vitamines, and there is very little to determine what these are. Some three years ago the Research Council of Canada made a grant to further the investigation of Vitamine B. They have got it down to a certain degree of purity to-day. They obtain it from rice polishings which contain what is called "allura." It is just under the rind of the rice grain. It is also present in the wheat grain and taken off in what, I think, is called "shorts" when the wheat is there. They have separated this, along with a phosphorus compound called "Vitone." This substance is present in Vitamine B, and it is the devil's own job to get the Vitamine B free from the Vitone, and that confuses everything, but they hope eventually to get it and to ascertain what it is. Folk and my son thought it was related to a certain acid. If that is so, then there would be some justification for this. I am telling you this to show you what the difficulties are to-day in facing the question and to know what a Vitamine is. The Vitamine C is difficult to isolate, and probably will be isolated last—if at all. Vitamine A is much greater than Vitamine B. Vitamine A is responsible for the normal depositions of calcium and phosphorus

in the tissues. It is, of course, not the only thing that is responsible. It has been demonstrated to-day that sunlight is a favorable factor, and that the ultra violet light (sunlight contains ultra violet light) contains enough of bright sunlight to enable tissues to make the Vitamine A. Quite recently there have been observations on the effect of the ultra violet light. It has been found in the absence of this light, and in the absence of Vitamine A, there is a want of the power to assimilate calcium and phosphorus; to utilize it, you may feed the individual with calcium salts and phosphorus; they may be absorbed and passed out unchanged, or, in some cases, they are not absorbed at all; but in the presence of ultra violet light or bright sunlight the calcium salts and the phosphorus are absorbed and they are utilized. Well, the absorption is apparently promoted. It was thought, of course, that the ultra violet light reached the intestinal tract, but that, on mature consideration, is found impossible, and it is now believed that the ultra violet light and the bright sunlight change the activities of the tissues so that they could do something which is the equivalent of Vitamine A, or they may produce something which, in the circulation, acts upon the intestines to make it absorb calcium salts and phosphorus, and thus make them serviceable for depositions.

I think, from all I can gather on the subject, that so far as the problem of dental hygiene is concerned, the central factor is this Vitamine A. Well, it is not everything, perhaps, but there is something in the evidence. It is remarkable how certain communities in the world, certain races and individuals, can go through life without a single injury to their teeth. I have been in South Africa, in the Victoria Falls district, and happened to see a number of natives on exhibition. I got some of them to show me their teeth, which were clean and white, but their gums were drawn, and I was told at the time—16 years ago—that they were very much the victim of tooth trouble, but that Barotse and the Mweru were very free from dental trouble. I am rather interested to note, from Dr. Thoma's address, that it was the Cassava they use. They simply take the grain and grind it, and eat it in that fashion.

In China recently I was interested to find that the lower classes use "millet"—this is something like our timothy. They have to take enormous quantities, and because of the amount they have to take their abdomens protrude somewhat. Among the children of the lower classes the teeth are not affected at all, and I am told that tooth trouble is very rare. I am told that among my own ancestors in Scotland, one lived to be 104 and never lost a tooth; a grandfather of mine lived to be 102 and had not a single tooth affected; my father had only lost one tooth in his age of 89 years. Now, it is the ordinary food—but plenty of it—such as cheese, oatmeal, milk, fish, mutton, mixed with a little good Scotch whiskey (laughter). The early settlers in this country were not bothered with dental trouble. Some of you may have other impressions which do not bear me out, but I do think that dental trouble was much less known, 60, 80 or 100 years ago in this country, than now. There is too much desire to indulge in food of a certain type. The consumption of sugar has enormously increased. I think that something like 60 years ago there was consumed in America about 12 or 13 lbs. per head per annum—it is now 77. This is responsible for the enormous amount of diabetes. In the old days diabetes was rare,—in the days of Hypocrates or Aristotle it was practically unheard of. Even two centuries ago it was uncommon—it is only since sugar has been an extensive element of diet that diabetes has become prevalent. Prof. McGill, of the Calcutta Medical School, has been making observations on the natives on the East side of the Indian shores, and he finds that amongst the wealthy about 30 per cent. are bothered with diabetes, whereas, amongst the poor, there is rarely found a case of diabetes. The wealthy use carbohydrates very extensively, become very fat after 40, and there is the picture of the symptoms which precede diabetes. There is no doubt that to-day our diet is lacking in many things, and it is going to be hard to change. The young generation to-day are set on a certain line, and what are you going to do? You are not going to lose your professional careers, gentlemen, you are going to have them still, and probably you will be more engaged than ever before. It is difficult to get people to accept anything like reasonable advice. Tooth trouble, caries, etc., are likely to become more and more pronounced, and other diseases are going to come, just because of the unsanitary character of the diet. Caries is not, of course, initially a bacteriological disease, but is promoted by unscientific diet.

Gentlemen, I do not want to give you a lecture to-night, but merely thought I would express some of the opinions or views I hold on the subject. I would like you to consider that these are the secretions of glands, and necessary to us and the animal kingdom. They can be produced. Vitamine A can be produced by ultra violet or sunlight, but the others cannot; therefore Vitamine B and C have got to be produced from the vegetable kingdom.

The Chairman: I will now ask Dr. Berwick to express the Club's thanks to Dr. Thoma for coming to us—both at the Clinic and this evening.

Dr. Berwick: I have to tender you the thanks of the Clinic for the very enjoyable afternoon and evening you gave us. I am sure we have all derived a great deal of instruction both at the Clinic and this evening. I will not tender you a long eulogy, but I feel that everyone in the room feels as I do about it.

The meeting then adjourned.

IMPROVED PULP CANAL FILLING TECHNIQUE.

BY HARRY JOHNSTON, D.D.S., *Atlanta, Ga.*

February 5, 1924.

ALL my work is based on (I am speaking now of the opening and filling of the pulp canals) that done by Dr. J. R. Callaghan, of Cincinnati. Dr. Callaghan was the first one to advocate the use of sulphuric acid and soda bicarbonate in the opening of the canals, and he was also the first one to use it. I take it you are all familiar, more or less, with Dr. Callaghan's work, so I won't review it, except where it is necessary to bring out my point. To Dr. Callaghan's technique I have simply added one point, which I consider to be essential to the completion of his work. I have known Dr. Callaghan personally, and have talked with him a number of times. He has visited us in Atlanta, Ga., and, I believe, was fully aware of something missing in his technique. I believe what was missing was that he had not utilized the principle of diffusion in canal filling. He was looking for something, he did not know what, at the time death overtook him, and I do not doubt that had death not overtaken him he would have found this simple little thing of diffusion. The materials he used, and I use, you are familiar with. Most of our work is done on teeth that have been for some time pulpless. We now know how to conserve pulp without making so many extractions as we did.

The problem of absorption is not such a serious problem. It is comparatively easy, because the difficulty of opening and smoothing the canal is not great, but the problem of the tooth which has been for sometime pulpless is more difficult because of the increased difficulty of opening these canals and preparing them for the filling. The entire thing is one long series of diffusions. For years it was considered necessary to fill only the main, or trunk, canal. Now we recognize that that is only one of the canals, and that the preparation and filling of that canal is simple, comparatively speaking. When filling only the main, or trunk, canal, we found that many of our cases went bad on us, afterwards showing infection or reinfection, and that is one thing that promoted the growth of the 100% Club.

Numerous investigations have shown to us that the majority of people have from two to fourteen—I think fourteen is the highest count I know of on one-tooth root canals—that is, necessary canals. I hold that it is important to fill each of these, no matter how small. The impossibility of locating these before filling makes the problem a difficult one. We do not know where the little canaliculi are, their number, their direction, their location; do not even know

where they are, whether there or not, and yet we are called upon to fill them, and we will not know where they are unless we fill them, for our radiograph will not show them unless they are filled with some substitute. At first it looks like a large order, and it is; but, thanks to this simple law of diffusion, it is not as difficult as it seems. First we go into the tooth with this acid which Dr. Callaghan brought out. This has a great affinity for water. These accessory canals are filled with some watery solution, serum, or broken-down pulp tissue, or disintegrated vessels, and, owing to the great affinity that the diluted sulphuric acid has for the water, it follows these little canaliculi to their end. Using 30 to 40 per cent. (I use 40 per cent., sometimes as high as 50 per cent.; he used 40 per cent.) acid we do not bring about any marked damage to the tissue, for bear in mind that this acid is limited both as pertains to the tooth structure and to the soft tissues. It will penetrate to the foramen and there it will stop, because it produces coagulation, which bars its further progress.

It is in these accessory canals that it exercises somewhat of a burning; there it acts upon any remaining tissue that they may contain; neutralize with sodium bicarbonate solution, a violent effervescence takes place, and the sodium bicarbonate follows the sulphuric acid as a cat would follow a rat. Where it is, it goes with tremendous rapidity and fills out and leaves a number of clean, bare walls of the canaliculi, through the cementum, so by this means only can we treat or clean out these canaliculi, the presence of which we were not aware of; yet, owing to the law of diffusion of liquids, we can clean them out regardless of where they are, their number, length, direction, or anything else—all lines are straight lines, and it will go around a loup as rapidly as a straight line.

In the meantime, we have been preparing our main, or trunk, canals for the reception of the filling, and to assist in the transition of diffusion into these accessory canals.

Alcohol is the union between water and chloroform. There is an absolute antagonism between water and chloroform. One will not go where the other is, so the walls of these accessory canals must be freed from water. This can be done with alcohol or acetone (I prefer alcohol). Alcohol has a well-known affinity for water, and after we have neutralized for the last time and washed out our canal, with distilled water if we wish, the alcohol is pumped into the dry canal, which, by the way, has been previously cleaned of its watery substance by using absorbent points. We do it mechanically in the trunk canal, then our alcohol—95 to 100 per cent. pure grain alcohol—is carried into the dry canal, permitted to remain there for two or three minutes, in which time it will absolutely absorb all the water in the accessory canals; the water flows into the alcohol and the alcohol into the accessory canals until we have a balanced

solution. Anyway, start with 95 per cent., less 1 per cent.—94 per cent.; or, if 100 per cent., may be 99 per cent.

Chloroform has a great affinity for alcohol. Chloroform will diffuse perfectly through alcohol. So there we have the connecting link. Dr. Callaghan's method of absolutely dehydrating the trunk canals with the use of hot points and hot air has been because he wanted to bleach the inside of the trunk canals if possible, and with these points it is questionable in my mind.

So there is where Dr. Callaghan's technique stops and mine comes in. I get a diffusion of the alcohol into the accessory canals, which must remain at all times filled with something. We must never empty them, for once we empty them, that means sealing into the tooth the solution you see in there—sometimes it is two, three, four or five days before that little bubble of air which fills these minute, hair-like canals can be coaxed out, and then filled. They are capillaries, and you know the definition of a capillary—a tube that you cannot pour anything into or out of; so alcohol furnishes the medium between water and alcohol. Then dry out our alcohol from the outer canals with absorbent points. We then carry in a chloro-resin, made of chemically pure alcohol with a very minute quantity of pure water white resin. Dr. Callaghan used something not as good as the water white. The water white is a much purer and much more adhesive resin. So we have made a change there. Dr. Hinman was responsible for that.

There must be but a minute trace of the resin in there. Unless your technique is extremely rapid, you may have entirely too much resin in there; the chloroform evaporates, but the resin does not, and so many, in starting with an alcohol solution, find their points do not dissolve—will not—may not dissolve at all; the operator probably could not see the point of the canal, and so he went through the motions on the supposition that his canal point dissolved, and it did not. Then he took his radiograph and saw that he got within a reasonable distance of the apex, thought it a good job, and let it go at that. The point, however, was not dissolved.

It is my practice to have simply enough of this resin, which is light in color, to slightly tint the chloroform. Here we have another substance for diffusion. The chloroform draws the alcohol from the canaliculi, and it is itself drawn into the canal and furnishes the medium with which to convey our gutta percha. Gutta percha is entirely soluble in chloroform, and, practically speaking, any place that chloroform can go, gutta percha can go, for its diffusion is very minute. It will follow the accessory canals, and that is what we are after, to seal these external openings. To my mind, it does not make it difficult. We are not trying to force anything. The only thing we are trying to do is to dissolve perfectly. Gutta Percha will follow

chloroform to a most astonishing extent. I do not claim—I cannot—that gutta percha is a perfect filling material. It is far from it. Many tell me that the gutta percha that goes into these minute and lengthy canaliculi must be so thin that it cannot possibly hermetically seal these small tubes. I do not claim that it does in every case, but it is the only means I know of that even makes the effort to fill them; so must we not make the effort when we recognize the necessity, because we realize that we are trying to do something we cannot do in every case? I think we should fill them as perfectly as we can, so we should only half fill them at this time—perhaps later on we can find some better way.

Now, the great point of this and every other filling is the material we have to use for the filling. The longer I work with gutta percha filling the less I like it. It has one vital difficulty. I am still using it because it is the best thing we have at the present time; but it has one defect which condemns it—it positively will shrink; in any form in which you manipulate gutta percha it will shrink. I have packed it in glass tubes, or with hot air playing on it, it will shrink; and I would condense it into glass tubes with an automatic mallet, and in fifteen minutes it would have shrunk away from the walls of that tube; heat it up again, it will shrink and go back. This shrinkage, which begins almost immediately when the heat is taken from it, continues for 24 hours, approximately. It is a peculiar material in this respect. All of the shrinkage will not take place at once. It will continue to shrink for approximately 24 hours. If that is the case with simple heat, you know it is greatly exaggerated when placed in solution.

The ideal root filling, to my mind, will be where some brilliant chemist or dentist will bring out a series of solutions which can be placed in the teeth entirely by diffusion, and by causing to harden with the addition of some other solution, to harden perfectly in there without shrinkage, and to meet the requirements that you know the root filling must mean. I do not think I am enough of a chemist to ever work that problem myself, but I am convinced that some day it will work out on that basis; that the series of solutions will be such that when the last one is added there will be hardening without shrinkage.

We cannot prevent this shrinkage, but we can to a very large extent control it; we know the shrinkage is going to take place; we know the lines along which it will ordinarily take place; and we know the lines along which we wish it to take place if it must come; so for quite a long while I experimented with various ways of control of this shrinkage. It is a well-known fact that when shrinkage takes place in a mass, which is not a heterogeneous mix, it shrinks from the softer part to the denser part, so that immediately there is suggested

to my mind the possibility of making the centre of our filling the softer part, instead of the denser part. So I have added one more specialty, after the gutta percha has been caused to dissolve as much as can be dissolved, and that is an astonishing quantity in a trunk canal; and while you are doing that gentle rotary or vertical motion—with just those few simple rules, I will dare any man in the house to comply with these four rules and fail to fill the apex. The difficulty is that you have the idea you have to force it through. When gutta percha has been diffused, it is a combination of diffusion and mechanical mixture in these accessory canals.

Now, there are two things after that I wish to do. Diffusion will carry to the canals, but you have after that, beyond. Now, it must go beyond on account of this inherent weakness in gutta percha. So, first, I produce a pressure there to force the excess beyond the ends of each of these canals. I must invariably confine the shape of that excess to a half ball, which is gently rounded externally, and then fill in the finer shaped canals. Now, the purpose of that ball is simply this: We know that gutta percha is going to shrink perpendicularly and axially, so after we have a ball of gutta percha which is larger than the foramen, after the shrinkage has taken place, then the shrinkage of that gutta percha is going to exercise a pull that will draw that ball into the foramen. Now, the ball was molded by the foramen as it passed through; it was a perfect fit, and it will be drawn very tightly there, as though you were going to pull a cork out of a bottle with a string.

Now, in addition, I want the centre of my mass to be the softest and to remain soft for a long time, for the process which carries off this chloroform from our filling is one that takes place very slowly, and it is a question, in my mind, whether it does not cover years, instead of months; so, after I have produced my condensation, I have condensed as much as I dare, then I make out of the centre of that canal what I call a central shrink wall; in other words, it cannot shrink towards the centre to the extent that it otherwise would. I feel that I am doing well; how well depends on the degree of curvature and the size of the trunk canals.

INSTRUMENTATION.

The choice of instrument is of great moment. I have used all of these that I could. The thing found most useful in my hands is the file put out by the Detroit Dental Mfg. Co. It is an extremely flexible instrument, very rapid and very smooth-cutting. It is, as you doubtless know, a spiral cutting, made on the order of the screw, so that it cuts with this continuous spiral edge, and leaves the surface just as smooth and polished as ivory, greatly facilitating the placing

of our various solutions in the canal. The curved pulp canal file has a cutting point; then follow with the double extra fine file, which will follow the smallest canal you can conceive of. The point will actually enter, and with a slight twist it will actually cut, following your canal in the meantime; get into the canals; one-eighth turn, and withdraw. It is ordinarily easy to perforate the walls of the apex if you insist on doing so. That is practically the only instrument I use in the canals. I often use it for the removal of pulp. Many of these canals are too small where the pulp has been subjected to long irritation. They are too small to get the smallest barbed broach in all the way, and yet, in all my work, I have never seen but two canals that were too small to very easily and very quickly twist one of those files to the absolute apex, or as far as I wanted to go; for, of course, the pulp is easily and quickly removed. Once you get your file up it is not removed entirely, but chopped up and easy to get out just the same.

The curved file should always be bent to approximately the curve of the canal in which we are working. That is a difficult thing to do. It sounds as though it would be easy, and the majority of people think it is easy. You know what curve to expect in the canals—molar, upper molar, etc.—but find you get into difficulties there because you do not curve exactly the way they should. I have changed the wording of the expression “opening the canal,” and I prefer to call that the “canal.” If the opening is a very simple one, we find it. Now, the canal is always there, but it is often very difficult for us to find it. It may be that there is pulp nodule formed in the canals, which seems to us to have blocked that canal, but a curved instrument, properly manipulated, will quickly go around that little nodule. I just recently had a case that illustrates very favorably to me the value of this thing of curves, the instrument to approximate the curve of the canal and then probe for the canal.

Now, the process of opening is a simple one of probing—no matter how small that canal is. It is up to you to find out, and with a double X curve file; if any instrument will find it, that will, so it is a process of very delicate probing with the curved point of your instrument, turning this way and that, and very often it will go through. A case was referred to me from one of our smaller Georgia towns. The patient told me he was trying, almost daily, to open this particular canal. I knew he was a good man, so I said: “First sit down, and I will see what can be done.” It was a mesial canal, also molar, and so I gave my file the ordinary point I still use; picking it up, I got in there and placed it in, and it went with one continuous motion on through, and the patient nearly jumped out of the chair. That gave me difficulty when I started in to fill, because you cannot open those gutta percha points and make them stay

open. His only mistake was his trying to get into a straight canal with a curved instrument.

Keep in mind that when you get any of those difficult cases it is not a matter of opening the canal, but of finding it. The canal is there, and open, and it is up to you to find out where it is. You have got to have technique if you have not already got it. If your skin has any tendency to be callous, you must keep a piece of pumice-stone to use before you go after those canals, because they are sometimes so small you can hardly feel them. It is part of my daily toilet to take off any callouses of the day before, for I think, with any of these small instruments, the skin will callous to some extent.

Filling is a simple thing once you get the canal thoroughly cleaned out and the rough spots on it cleared off. (Keep in mind that I have a standing bet with you that if you will do seven simple little things, I will depute you to fill that canal.) One of these things is to carry your point as far as you can carry it, and a proper-sized point; it is not a question of not getting the canal filled, and filled with a very dense gutta percha, for you can move that point, continuing the motion until it simply refuses to budge. Of course, you could pull it out by main force; the thing to avoid is getting too much excess there.

Your gutta percha point must be properly selected. As a rule, I do that just before I carry my alcohol in. From long practice I can tell the diameter and the length of my canal without any measurements. But if you are not sure of the size of gutta percha point you must use, select several and try them in. Use wire for getting the length of the root if you wish, and measure the length of the canal by your wire, and the size by the calibre of your canal. I have not gone to any extent into precautions for sterility; that is hardly necessary, as it goes without saying that the tooth is always under the rubber dam. The tooth dam and clamp are always fully wiped with alcohol, followed by iodine, which is permitted to remain on for about three minutes; then the excess is washed off with alcohol, simply to avoid getting too much on your fingers or your instruments, and a large area all around, and any point where it is likely you would touch with an instrument. Then your temporary filling is removed and you enter the pulp chamber. I think it is criminal to go into the pulp chamber without these precautions. If it is a case where you are expected to ionize immediately, I do not think it necessary to be so very cautious in this respect; but it is better to make this your routine practice, so it becomes second nature. See that your assistant has everything ready, and go to it.

I would like to take five minutes of your time to tell the physicians present something about ionization. This is a process of driving iodine from a highly electrolytic solution into the tissues by means of

a mild current. I have made all kinds of experiments on this, and used to do a great deal of work. I will describe fully the method of sterilization of the apical tissues. The patient presents what we call an infected apical area, and at that stage it is usual simply to pass an absorbent point to the foramen and permit it to absorb as much of the apical fluids as it will. A culture is then taken, and a report made on the kind of infection present, and any information the test will bring out. Then the tooth is ionized by a technique which I will go into thoroughly to-morrow. Current is allowed to flow through this iodine, forming a connection between the alcohol and the apical tissue, for fifty minutes. Iodine is then absorbed, the tissue washed out thoroughly with a prolonged washing of alcohol; then a prolonged wash with distilled water follows; then thoroughly dried with absorbent points, with hot air, with root canal driers, to get out all alcohol by means of a vacuum pump.

You now open it and take it out. If you do not fill the canal immediately after your ionization, within a week there will be re-infection. That has been my experience uniformly, so I always fill immediately after ionization. In 30, 60, 90, 120 days, or six months, or whatever it may be, if I have properly filled that root, I have shown that root to be sterile. I cannot conceive of a more drastic test than that. The extent to which you can push these tests will be very clearly illustrated by showing that I have taken certain teeth and done this. Take a culture near the gingival crevice of that same tooth and you will get the identical growth that I got on my thirty-minute aspiration. You can actually draw the bacteria from the gingival crevices, through the lymphatics, into your canal, up into the pulp chamber; so if you can tell me any way to make a wider test as to sterility than that, I would like to know what it is.

Chairman: We will call upon Dr. Baxter for a few words.

Dr. Baxter: Mr. President and Gentlemen: In the presence of such wonderful work, my effort is almost hopeless. I saw Dr. Johnston's work some two or three years ago, and on looking at the radiograph productions in connection with this article, I said that I would take the slides and show them to the students, and I also said—if we could only get this man to Montreal it would pay us 1,000 per cent. I think what we have seen here to-night has proven this up to the hilt, and if he can only teach us anything like what he has shown here to-night, we will be amply repaid. His description of opening up the root canal with a curved file is a problem to me. I must confess I have a great deal of trouble with many of the canals I attempt, and seem to come up against a stone wall, as he explains it, even with a pathfinder. I use a tool of the 20th century style of file and I find great difficulty. It takes weeks and weeks to make an opening in some of these canals. If Dr. Johnston can show us how to open up as easily as he describes it, we will be gratified. I think the wonderful work that this gentleman does, which is actually proved by radiographs, is, in my judgment, beyond criticism, and if he can show us how to do it, we will be eternally grateful.

The Chairman: I shall now call on Dr. Johnston for a few words on the subject of root-canals.

Dr. Johnston: I probably will not give you as much as you would like, for I will admit that this is one of the most embarrassing problems to deal with. I carry into the canal 40 per cent. sulphuric acid and pure phenol. I find, in the majority of cases, I can carry this to the apex with comparatively little pain to the patient, but I warn the patient that he has to put up with something anyway. I had one case before I left—a medicated case,—and of all

the cases I hate to get, it is one of these. I tell the patient, you are up against about the worst case, it is going to hurt you like thunder for a second; and then I take my double X file, and with one stab I go to it. But in the majority of cases, you can get a mixture of 40 per cent. sulphuric acid and pure phenol in there without much pain to the patient. Do not temporize. If you find you can get it one way or the other, go get it. It seems that it is our best patients that come to us with this thing,—we do not wish to hurt, but you have to tell them—what do you think I am—a manicurist, not a dentist?

A Doctor: I ask Dr. Johnston how he does his artificial opening. There was one that looked like an artificial opening.

Dr. Johnston: No, Doctor, that was not an artificial opening. It couldn't have been made artificial by any instrument I know of. I believe our only chance is to treat those openings as though they were true canals and endeavour to fill them. Often you have to leave them entirely alone until there has been complete healing, and the formation of tissue so you can get the tooth structure at that point. Then go in and treat it as if it were a canal and fill it accordingly.

The Secretary: Do you use any acid in conjunction with your curved file?

Dr. Johnston: Yes 40% sulphuric acid.

Dr. Jenks: I would like to ask you what your feeling is and the feeling in the States, regarding the relationship between pulpless teeth and general conditions?

Dr. Johnston: Of course, that is quite a large question. We believe it has been vastly over-rated, but unquestionably many systemic disorders can be traced to infected apices. They come largely under Dr. Hinman's subject of diagnosis.

A Doctor: I would like to ask Dr. Johnston if any experiments have been made with these teeth, say for six months or a greater period, that they have been treated, do they seem to show new bone formation? Or any growth at all?

Dr. Johnston: Well, Doctor, I have never extracted a tooth I believed had possibilities of recovery. I did make 100 tests by the method described a while ago, of aspirating apical fluids over a considerable area, and I have always felt that if we could not get any degree of infection at all from the aspirations of the apical fluids, we were safe in saying that if there was any infection at all it was such a slight amount that there could be no harm resulting to the patient, for we know there are many infected pulps—perfectly vital teeth—that are not giving any trouble at all. Many have shown that,—Teeth with large cavities showing a very considerable beginning of tooth infection, and yet no systemic disorder—the tissues will tolerate perfectly a certain amount of infection; but in the 100 tests I have made—and a hundred is not a large number—we have found, practically speaking, no infection, that is, no infection we would consider worthy of notice at all.

A Doctor: When Dr. Howe was here he showed me some beautiful specimens, much the same as you have here, except that there were many canals in teeth that we were not aware of before, and he claimed that he was able to fill these canals. He claimed that he sealed the canaliculi in every case, but that he was not particular as to whether he filled the rest of the canal, full around, so long as he got the apex and the ends of these little openings filled. I notice you told us that so far as gutta percha was concerned, you were not sure that gutta percha was the right thing.

Dr. Johnston: I can tell you Dr. Percy Howe's opinion on it. He has been in Atlanta and will be there again next month. I explained all of this deposit filling and asked him: Don't you think that your silver deposit method would be improved if after you have deposited your silver you would draw all water out in there and fill that canal according to this method? Now, you cannot hermetically seal a canal with granulated silver. Dr. Howe said that he believed his method followed by my method would be the ideal one. I think that perhaps answers better from his mouth than I am able to answer.

Dr. Jenks: What is your conception of their formation? sometimes see in radiographs?

Dr. Johnston: They often give very severe trouble, but without a history of the trouble, I leave it at that, because the great majority of them never give trouble.

Dr. Jenks: What is your conception of their formation?

Dr. Johnston: Evidently some irritation of the pulp; just what that may be depends entirely on the case; large fillings, etc. There are a number of causes, anything which may irritate the pulp. When I get a double extra file, which is the finest of the curved files, I am satisfied I can fill that, but it may be that some could not. The foramen itself should never be enlarged. Enlarge to the foramen and make it as big as you want to, to suit your own convenience in filling.

Chairman: I am going to ask Dr. Forbes to say a few words.

Dr. Forbes: Mr. Chairman and Gentlemen: We all appreciate the wonderful advance that dental surgery has made in the last few decades. It is all very wonderful, I think. And when you realize that only in the '40's was dentistry separated from medicine; when we see the changes that have come, and appreciate what advances dentistry has made,—all you have to do is to travel in the old country and submit yourself to the tender mercies of the dentist, and see the difference between the mouths of the people who travel

in the tram cars, and the teeth of the same class in America, Canada, or the United States. To me it has always been extraordinary the advance dentistry has made in America in recent decades.

Now, when you come to the question as to where the surgeon, dentist and the physician are the closest, I should think it would be the question of dealing with infections. You all realize, of course, how much we attribute to infection in these days. In my particular branch we feel that a great many of the various forms of arthritis,—indeed, all the chronic forms of arthritis, practically speaking,—are due to infection, and a great number of the sources of these infections can be found in the region ruled over by the dentist. There has been one source of worry about this, and that is that the dentist, believing that rheumatism, for instance, was in some cases due to infection in the region governed by him, at once began to think that any person who had any pains of any description should immediately be operated on, and the man went to the chair and came back with his tooth, or teeth, extracted. I am speaking now of only a decade ago, and when I hear a man like our distinguished lecturer, Dr. Johnston, tell us how many of these teeth can be treated without sacrificing them, I cannot but feel that another great step has been made in dentistry. May I speak a few words to you on a subject that interests me most, that is, the sources of this infection which can be outwardly seen,—infections in joints? We have got to realize that while there may be an infection about the tooth, it does not mean that is the source of infection in the joint, and as far as we are concerned, as dentists and medical men, we have to realize that there is only one thing to do,—and that is, keep every part of the body clean. I am not talking about every-day cleanliness, but to keep each and every part of the body free from infection. If a person comes to a dentist suffering from arthritis or any other infection, with the idea of finding the source of infection in his or her mouth, it is necessary for us to realize that in all probability there are many sources, and although the dentist finds the source in his mouth, it does not mean that the patient is going to get well as soon as that source is eliminated. One of the sources has been eliminated, but there are other sources to be considered and dealt with.

Now, it has been a great pleasure for me to be at this meeting, and I think we, as medical men, fully appreciate the great advantage of these meetings. It has been a source of real pleasure for one particular reason, and that is, that I, perhaps, for the first time, realize how much stock the dental surgeon takes in diagnosis. Now, gentlemen, diagnosis is everything, from my point of view. The difference between diagnosis and technique is the difference between a trade and a profession, and when I hear dental surgeons speak as I have heard them to-night, about diagnosis, I cannot help but feel very proud of the dental profession on this continent of North America.

In conclusion, I would say it has not only been a pleasure for me to be here, but I realize, Mr. Chairman, how much good these meetings are doing, and what a great advantage it would be if the dental surgeons and the medical men would meet more frequently and talk over things of mutual interest. May I, then, Sir, before I sit down, compliment you and the Association on having invited us here. (Applause).

Chairman: We will now ask Dr. Byers to say something.

Dr. Byers: I should like to thank you, first, for asking us to be with you to-night, and to share in the pleasure of listening to Dr. Johnston's delightful talk. The dental surgeons and the medical men, as you all know, have been friendly in Montreal. Over 30 years ago the Medical Faculty of McGill University undertook the primary training of the dentists, and very thorough primary work was done by the dental surgeons, particularly in the anatomical room and in the physiology laboratories. Dental surgeons have been regularly constituted members for over 30 years, and connected with the establishment of the splendid clinic at the Montreal General Hospital, the foundation of the Dental Faculty of McGill University, and the relationship of the medical profession generally with the dental surgery has been made easy by the very high standard and personnel of the dentists of this city. I remember as a boy the great respect in which the older generations of men were held,—Dr. Lovejoy—and others—and we know how splendidly the men following them have maintained their standard of dignity and have held the confidence and esteem of the public.

In recent times, nothing has brought us more closely together than this subject of infection and the part played by the teeth in dental infection. It has helped us already in a perfectly marvellous way. It has excited our interest from the outset as to how the infected conditions would be met. It has been a matter of great interest to me to follow your work, and one must feel that work like yours, and particularly the spirit that lies behind it, must soon bring results, and when these results are obtained, we shall have done one of the biggest things in preventive medicine that has ever taken place.

We are constantly confronted with the problem of what is the right thing to do in connection with dental infection in our university work, and I wish to speak of a few practical points, to bring to your attention a few questions that arise. One thing I feel is of great importance. We are, as you have rightly said, in a field that is fraught with so many possibilities that we do not know where we stand, or where our studies may lead us, but it is essential that during this period we should keep correct records. I have insisted

very strongly on this in my work, because it may be possible to establish in time a certain kind of information through our studies which is characteristic of dental infection. In many cases, I have noted that the records are very thoroughly kept, and that the reports that come to us quite regularly are accurate and of high scientific value.

Now, Dr. Forbes has spoken of a point I had in mind, a point that will bear re-emphasizing, that is: that it will not do to assert any one possible source of infection, and say that this is the underlying cause of such and such a disorder, because our studies say that always we have at work a certain number of sources of infection. We take a syphilitic subject,—his physician thought a disturbance of the eye was of a syphilitic nature, but this may be absolutely wrong. We may have in this patient a positive source of dental infection, and on the other hand, if we seize on a dental infection and say that it is the cause of the disorder, we may be equally at fault, because our patient may be suffering from a systemic disease, so that the only examination we must be satisfied with is what we call the complete systemic examination, and we can only come to a proper conclusion when we have in front of us the facts.

Finally, the only person to pass judgment on a dental condition, is the dental surgeon. Despite the practice, and it is a growing practice, to be satisfied with an X-Ray examination of the teeth and possibly an opinion by an X-Ray expert, I feel that this is fundamentally incorrect and may lead to unnecessary expense and wrong conclusions. Now, the dental surgeon should first examine the mouth and say whether an X-Ray is necessary or not, and with the facts before him give to the medical profession his conclusions in regard to the findings in the mouth. (Applause).

Chairman: I am going to ask Dr. Jack to offer Dr. Johnston our thanks for his paper read here to-night.

Dr. Jack: I am very pleased to tender to Dr. Johnston the heartfelt thanks and appreciation of the members of the Association for coming here all the way from Atlanta, Ga., and facing rigorous climate such as we are having, and not only that, but a rigorous subject as well. He has gone through a bombardment of questions to-night, and still has another bombardment ahead of him to-morrow in his Clinic.

I am sure that I express the feeling of the members present, in moving this vote of thanks to Dr. Johnston. I thank you, Dr. Johnston.

ORAL DIAGNOSIS.

BY THOMAS P. HINMAN, D.D.S., *Atlanta, Ga.*

February 7, 1924.

MR. CHAIRMAN AND MEMBERS: It is a real pleasure to have this opportunity of meeting you, and I feel that I have received a great deal of pleasure from my visit here; in fact, I will receive the greater pleasure and benefit. Our problems are many; we, in our small way, (and when I say "we" I mean the men associated with me), have attempted for a number of years to do something with one problem, one that has given both the dental and the medical profession a great deal of trouble, and yet remains to be solved—and that is the question of mouth infection and its relation to systemic disease. It is one of those things that is mysterious. It is one of those things that we cannot approach from any one angle, because we have so many modifying factors that it seems as though the question is far from solution, and while I am quite convinced in my own mind that our great trouble has been, as dentists, that we are not diagnosticians; our pathology is the same everywhere—possibly we have not been educated along the particular lines of pathology, and there we have been handicapped. But we have

this question, and it is a serious question, and has occupied the minds of pathologists ever since Hunter called our attention to it. Now, don't think this is modern talk. It is not. If you were to examine the writings of those who have gone before, as I have, you would note in the *Dental Cosmos* of 1862 an article there in which the question is asked: "Does not the mouth bear a distinct relation to disease in the human system?" Later on he makes a further statement, speaking of diseases of the mouth in his book on "Bacteria"—he was the first man to assert the large number of bacteria in the mouth (I think, 150 varieties)—so, you see, this is no new problem; but its control is the problem of to-day, and we must necessarily first discover, as far as we can, its cause, and then find out if there is not some remedy.

There is just one thing, before I go further, that I want to clearly state. I want our profession everywhere, as well as the medical profession, to quit calling pulpless teeth *dead* teeth. Let us go back for a minute and see why we should not call pulpless teeth dead teeth. The pulp has been removed, the pulp is dead, but what is the pulp formed of? The pulp forms dentine; I want you to get that in mind, and keep it in mind all this evening while we discuss this problem. Whereas the pulp is dead, the cementum still remains alive. I have prepared just a little preamble to the slides we are going to show, and remember that we can only approach this subject in a broad way, because it is so great, and there are so many angles you can approach it from, that you necessarily have to be generous.

Let us speak for a moment on apical disease. So much has been written of the apex and the sub-apical area, and so much misinformation has been published about this question, that I think it high time that we pause long enough to apply some common sense to the problem.

It is very gratifying to find the profession returning to sanity after the brainstorm through which it has passed in the last few years. I feel quite sure that this problem has found a solution, but it does seem that we are living in a period of utter darkness, and the light of knowledge seems so dim that we fear some will fail to find their path.

Opinions favorable to it are based on scientific data. The slogan used to be that all pulpless teeth should be extracted. Fortunately, a few men maintained a fair mental balance. It seemed as though for a time the art of treating teeth was to be placed in the discard. After a careful survey of the situation I became thoroughly convinced that many were condemning pulpless teeth for four reasons:

- 1.—Inability to make a correct diagnosis.

- 2.—Lack of technique for opening and cleaning root canals.

3.—Lack of knowledge of a satisfactory method of tooth and sub-apical sterilization.

4.—A satisfactory method for filling root canals.

Let me speak for a moment on that problem before I go on any further. This problem is one to which I have given over thirty years of work. Dr. Johnston, my associate, has been working on this problem for over nine years. The first thing we had to determine was, to seek some method, some means to produce sterilization, or approximate sterilization, in the sub-apical areas that were infected, without destroying the vitality of the surrounding tissues; some method that could be used that would stimulate the cell growth and also the surrounding tissues. This was the great trouble. It was decided after a number of experiments, which I will not detail, that the electric current was the best thing to carry the medicines into those areas. We found by a series of experiments that when the amperage was increased the electric current produced coagulation, and immediately coagulation was produced the passage of the medicine stopped; so by a series of experiments we reduced the current to where we have been able to carry our medicines where we wanted them to go and not produce coagulation. In this way we were able to carry medicines where we thought they should go.

The next problem was the character of medicine. Numerous chemicals were used, and, at last, through Dr. Johnston, this was solved.

The next question, when this was complete, was, how much time was necessary to carry the electric current to the point where we could produce sterilization, and it took a great many experiments—something over one hundred—to find out that particular thing. We found we could do it in thirty minutes. We did this under just as nearly normal conditions as possible.

I would like to say to those who possibly did not hear Dr. Johnston, one of our methods was to take a culture which was immediately brought to the bacteriaologist, and then brought back to the office, and, under proper sterilization conditions, was subjected to the electric current, and we found that we could produce sterility. When I say sterility, we must know that all sterility is more or less approximate. We found that we got 98 per cent. of all our cases when the sac was removed and cultured; the apex of the tooth which contains the cementum was excised with sac and it was cultured, and were also around 98 per cent. negative; and those that did grow bacteria were very weak—so that gives the percentage.

The next problem we had was to find a satisfactory filling material that would follow out the many foramina that are in the apex of the tooth. We found there are from one to fifteen—that problem was solved by a large number of experiments.

When this treatment was instituted, we found something occurring that we cannot exactly give a reason for, and that was where the apical area was distinctly destroyed in the bone; after a reasonable length of time the "lamina dura" returned—and there was a return of that bone. We were taught that that cementum was dead. That was not true. We started out on this hypothesis that the apical cementum remained alive, and that there was a reformation and a return to an approximate state of normality. In discussing this matter with Dr. Noyes (one of the greatest histologists in dentistry in the world, who lives in Chicago—you will probably know his work), the question was taken up with him; he found that the pericementum still remained attached to the cementum and was floating in infection, and that as soon as we destroyed the maximum amount of infection, it began to function, and we had a return of the "lamina dura." I am going to show you these on the screen to-night, and think I can prove to you that the "lamina dura" does return, and that these teeth do get well. I am fully convinced in my mind that millions of teeth have been extracted that should not have been. I also want to say to you that when you destroy the masticating power of a man or a woman by extracting their teeth, you are doing a very serious thing, and there is nothing yet that man has been able to place in the mouth that can compare with the normal thing that God placed there. Many hundreds, in my judgment, could have been saved, and that is the thing we have given so much time to, and that is the thing I want to present to-night. And I want to show you, as I did those in my clinic this afternoon, the differentiation between those teeth that have a chance to recover and those that are lost.

The X-Ray! Oh, what crimes have been committed in thy name! The shadow picture, the X-ray—you can make it say anything you want it to say—I think I know. I began work in 1897, and I had just a little experience with it, and it will tell you anything if you want it to tell it to you. It is hard to interpret shadows. We want to know something of what we are doing. I would trust the ends of my fingers much farther than any X-ray in the world, because I can determine areas that are slightly infected around the tooth, but when you take an X-ray picture, you do not have anything but one position; you are only half way round the tooth, and no tooth is condemned finally unless there are at least four or five pictures taken to determine the character.

What types of apical diseases cannot be restored? Wherever there is loss by erosion or any inroads into the area which are easily determined without taking an X-ray picture, we know of no method that will rebuild and restore that cementum; but where there is no erosion, these cases we consider favorable, and we have found that

in approximately 95 per cent. of these cases we can get restoration. Keep in mind that I am talking to you of the average run of patients that come to us—I do not mean the bedside patient. I am speaking of the man who has something the physician is not able to determine; he sends him to us, and we find certain conditions that possibly might affect the patient; teeth of that kind should not be fooled with at all.

Now, I want to say to you that some of us have gone too far. You have an aching joint—take out that tooth and you will get well. It happens that my association with the medical practitioner has been one of great benefit. We have talked over these problems, and we want to confine ourselves, as dentists, to our problems. Do not let us be diagnosticians. Remember, the physician sends the case to you with probably a definite infection, and expects you to remove that infection, and it is up to you to do it. It is not necessary that it should be by extraction; some extractions give more serious trouble than if the tooth is left in; so we must try to handle our case with a certain degree of knowledge, but we must send that patient back to the medical man who sends him to us, free of infection. If we cannot do that, we have missed our calling.

The other phase of the question is more dental. Let us take up this question of the disease of the attaching membranes and see what we can find out about them. Diagnosis should cover a careful survey of all the conditions, especially the gingival crevices. Let me say this: Recently it was my pleasure to speak on the mouth end of cancer, and I had the “predisposing causes.” The dentist should be competent at all times to look into the mouth and recognize what looks as though it might degenerate into a malignant growth. I feel that, in an examination of the mouth, the tongue and all the other diseases should receive our attention, because, frequently, we can save the life of some of our patients. We see the mouth—the physician is not expected to be as familiar with it as you or I.

What I am trying to get hold of is this—never look at the mouth with the idea that a tooth needs bridging or crowning. First, let us find out the condition of the mouth and the supporting structures—the condition of the supporting structures is of far more importance. The radiograph, properly taken, should show the tooth to the apex and character of the destruction. The character of destruction should always be a factor in the prognosis, that is, of the area of destruction. If this is not present, the infection is possibly of the infiltrated type, and the possibility of destruction is distinctly minimized.

A man brings me a small radiograph of the mouth. How do I know what I would do? I have never seen the patient, and do not know the condition of the patient nor the supporting structures, or whether that area is infected or not. What do I know about it? I

tell him frankly I do not know, unless it is some case that anybody can know. You must take into consideration more than the simple radiograph findings. In a recent work the statement was made by one of our leading authorities that radiograph findings are so inaccurate as not to be dependable. I wish to show you to-night, with evidence that I think is confirmatory, that they are dependable if properly taken. So few radiographs are properly taken—it is only a matter of a little technique when you can get just as good radiographic work as any one.

Another thing I wish to say to you is that there is a tendency in the States—I hope it is not here—to send the patient to a radiographer who is not a dentist, who may or may not be a physician; they may get a radiograph, but it is not worth anything. If you are going to do radiographic work, you must do it yourself, or some one in your office who ought to know something of pathology and histology, and something of what he is talking about. I don't want any of their diagnosis or pictures, because, as a rule, they are grossly inaccurate.

The Chairman: Dr. Hinman is open for any questions you might wish to ask.

Dr. Stevenson: Will you allow me to speak? The whole thing seems to be so simple when given by Drs. Hinman and Johnston that we wonder we have not done it before. Sir, as one of the older practitioners here, the result obtained by the filling of the root canal yesterday was an eye-opener to me. I should have expected to find the patient crazy with pain; about 24 hours after the operation I spoke to her and she said she had no pain whatever. I am afraid, Doctor, we cannot ask you many questions.

Dr. Hinman: I would be glad to make clear any points that are not quite clear.

Dr. Mowry: There have been many changes, and the trend of dentistry to-day, as far as I can see, is along the lines of clinical findings. Of course, it is the clinical that would interest me. I think it would be hard to persuade a patient that you could restore a new growth of lamina dura, and take out the entire section. Has any work been done along that line?

Dr. Hinman: Here's the trouble. You are doing a serious thing in cutting down and taking out the tooth before you restore the tooth function, and it may not be possible.

A Doctor: Would it not be possible to do it in some way with a monkey?

Dr. Hinman: Possibly so. If you have not seen Dr. Howe's recent work, you are going to be astonished, and yet the monkey is not as ideal as the rat, because the rat can be kept under fairly normal conditions that the monkey cannot. Some day we hope to do it with the rat. We can keep the rat under more normal conditions than the monkey. Although Dr. Howe has done some of the most marvellous things in dental destruction, I hope some day to do the experiment you have in mind.

Dr. Jenks: Can you tell us how you ascertain if the tooth pulp is infected and vital? Can you do that in the mouth?

Dr. Hinman: Yes. I am glad you mentioned that. Any tooth that has a considerable loss of its supporting structure, we do not attempt to treat. Particularly is this true in a case where we have an infiltrated type of infection. Again, where we have a granulated apex, there is no use fooling with that at all. The middle third is going to infect that area, so these teeth must come out. There is no help for a tooth of that type. We simply know by experimentations. We know that this tooth has a deep-seated cavity in it, and we find about 44 per cent. infected; a great many of these pulps slightly infected can return to normal, and this gives us a little encouragement.

Question: What do you advise where the X-ray findings run into a large area of cysts, and the patient is not aware that this condition exists in his mouth and is apparently in good health?

Dr. Hinman: I would assuredly remove it, because they are nests for trouble. I don't question but what they should be promptly removed. I don't care whether the patient is ill or not. The cysts have a tendency to come back. I regard these areas as suspicious, and while the patient may not be conscious of trouble, still, there is an area there and you do not know what it is going to be. It may develop into something serious. Where we have decided areas of destruction where a tooth has been extracted, I would assuredly remove them. I follow that practice.

Full Denture Construction for the General Practitioner*

BY I. LESTER FURNAS, D.D.S., CLEVELAND, OHIO

*Professor of Prosthetic Dentistry, Dental School,
Western Reserve University.*

(Continued from last issue.)

UPPER IMPRESSION TECHNIC.

THE patient is seated in the chair, and the clothing properly protected by a rubber or linen apron. The type of chair used makes little difference, but, personally, the writer much prefers the type known as the Specialist's Chair, manufactured by the Scanlan-Morris Co., of Madison, Wis. (Fig. 4.)

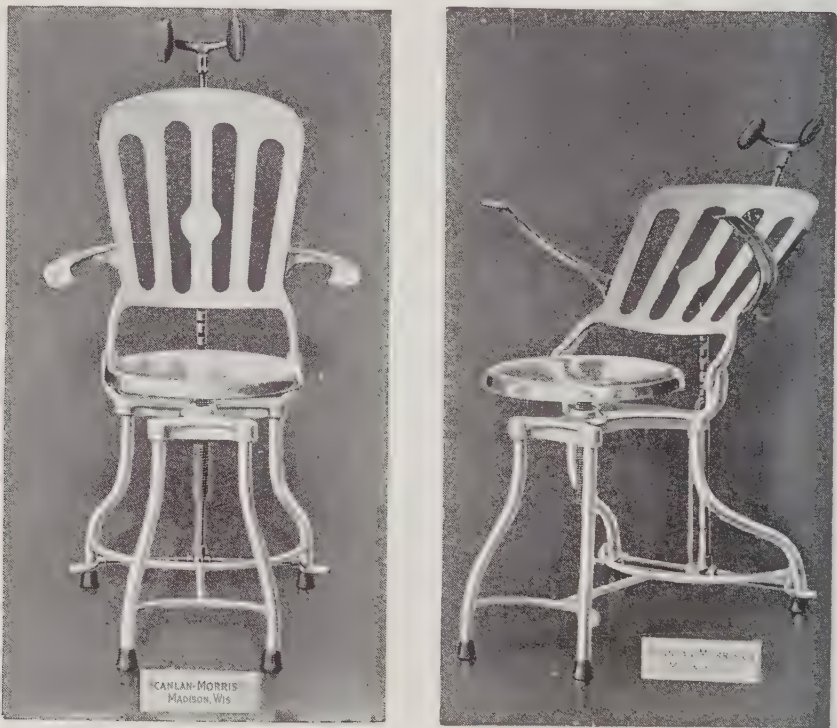


Fig. 4

The arms should be removed and the back and seat covered with a small Persian rug of the variety known as a "table runner." This prevents the patient's tendency to slip from position on the metal seat, and makes it slightly more comfortable. This type of chair gives a freedom of movement about the patient that the ordinary dental chair will not permit, and also does not recall so vividly

*Copyright 1924 by I. Lester Furnas.

to the mind of the patient unpleasant memories of past dental experiences.

A metal impression tray that fits the case as closely as possible is next selected. The kind preferred by the author is the soft aluminum trays made by the Detroit Dental Mfg. Co., of Detroit, Mich. Numbers 2A, 3A, 4A, 1, 3 and 5 are good, practical trays from which to make a selection for a big majority of cases.

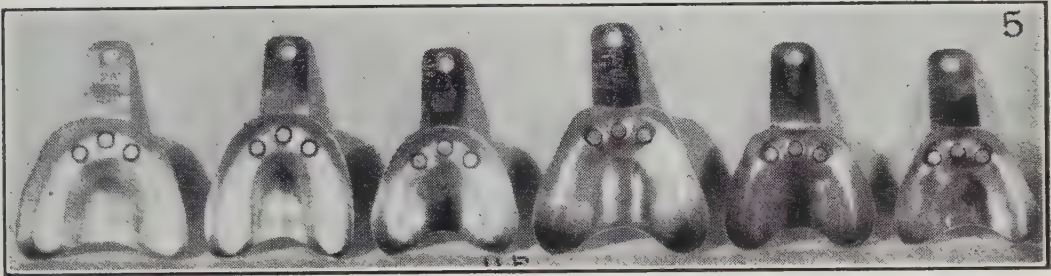


Fig. 5

These trays may be easily trimmed or contoured to fit the individual peculiarities of the case in hand. It is very important that the trays be kept absolutely free of modeling compound, plaster of Paris, dents, or scratches. If the operator has study casts to aid in this work the selection of a proper tray is rendered much less difficult.

When the tray is properly selected, the next step is to warm about one and one-half sheets of S. S. White tray compound. This material differs from the ordinary modeling compound, in that it is black in color, which gives it a definite contrast to the white plaster of Paris. It is stronger, and has more tensile strength, which permits of its being trimmed to a very thin edge without breaking. It also hardens more rapidly than the ordinary impression compound.

This material works best in a hot water bath at a temperature of 140° F. to 160° F. The most convenient method of heating is by the use of the Monson compound heater, manufactured by The M. F. Patterson Dental Supply Co., of St. Paul, Minn. (*Fig. 6.*)

This device consists of a metal pot heated by an electric coil, which is controlled by a rheostat. It also has a thermometer and pilot light for the operator's guidance. The compound is held at an even temperature on a sagging cloth base, to which it will not stick. The old method of placing a cloth or piece of paper in a pan of hot water and warming the compound in this manner may be used equally well, but not with the same time-saving and convenience.

When this tray compound is thoroughly warm and soft it is taken in the hands and kneaded like so much putty until it is all a smooth, homogeneous mass. Working all the wrinkles to the under side, it is then roughly shaped in the form of a triangle and placed

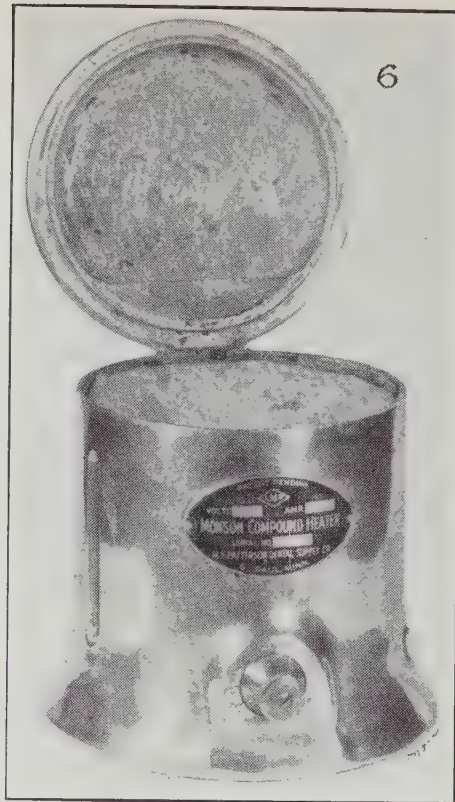


Fig. 6

in the slightly-warmed tray. It is immediately smoothed and pressed out, covering the tray at an almost even thickness. (*Fig. 7.*)

There should be no excess extending over the borders of the tray, as this will interfere with its insertion into the mouth, and create a fold, or crease, in the material that will later break when the borders are being prepared. It will now be noted that the surface of the compound is covered with thumb and finger-marks. (*Fig. 8.*) These are removed by passing the tray and compound over an open flame, allowing the flame to play directly on the surface of the compound, which will immediately take on a smooth, glazed appearance. This

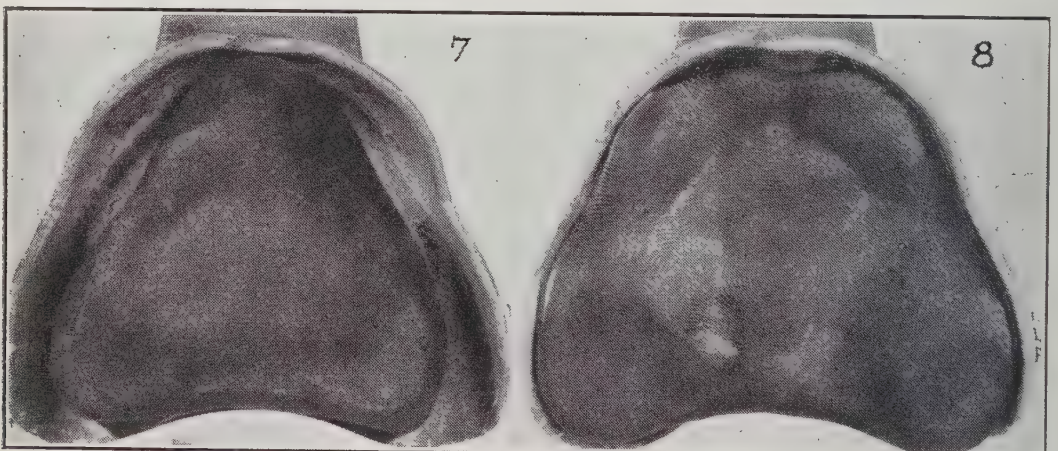


Fig. 7

Fig. 8

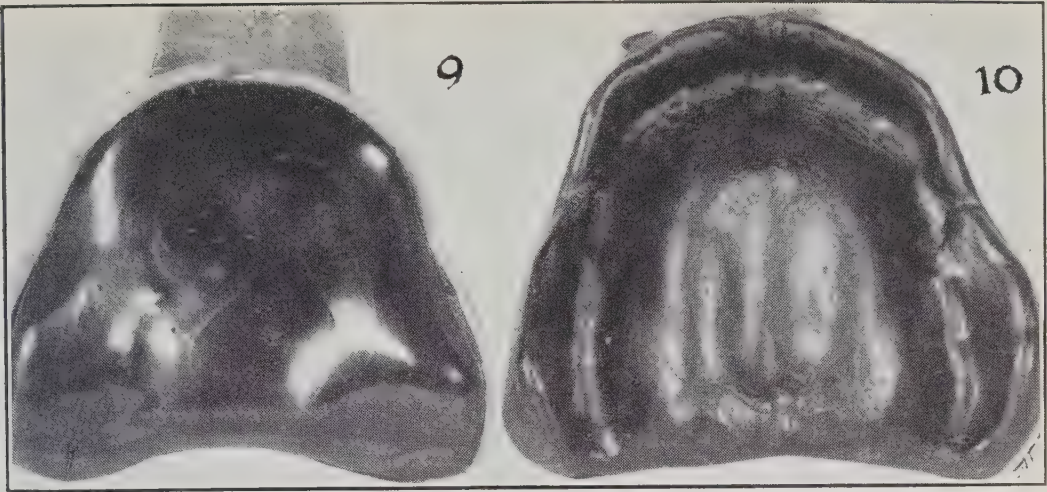


Fig. 9

Fig. 10

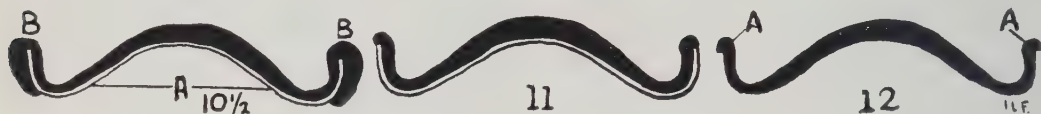
also super-heats and softens the surface of the compound, causing it to reproduce the finer details of the mouth in the impression. This is highly desirable, but not absolutely necessary. (Fig 9.)

After this surface is glazed, it is next returned for just an instant to the hot water to moisten and temper the dry, super-heated surface, so that it will not stick to or burn the patient's mouth. The tray carrying the compound is now gently rotated into the patient's mouth. The heels are next carefully centred and seated. This is followed by the seating of the anterior portion, which forces all of the excess tray compound *forward* so that it fills thoroughly all the space between the cheeks and lips and the ridge. Standing directly back of the patient, the tray is now held firmly in place by the index finger of each hand, while the fleshy part of the hands at the base of the thumbs rests against the cheeks. An even, steady pressure is now placed upon the cheeks, forcing them downward and slightly forward. The thumbs gradually come together against the upper lip at the median line, and the same pressure downward and slightly backward is exerted. An even, steady pressure is all that is required, just sufficient to mold and adapt the compound to the tissues. A massaging movement on these tissues is a mistake, because it is sure to give a *false muscle trim* that may be very misleading a little later on. As soon as the compound has chilled sufficiently, which should be in from thirty seconds to one minute, it is removed from the mouth and immediately plunged into cold water. Many a good compound impression has been ruined by an attempt to examine it upon its removal from the mouth and before chilling. The impression should, upon inspection, present a well-filled appearance, showing fullness, smoothness, and detail of all the parts. It is important that the tissues in no place have gone through the compound material and come in contact with the metal tray. It should be noted particularly that there is a well-rounded marginal turn all

around the border of the impression in order to make sure of ample material for trimming later on in the tray formation.

Figure 11 represents the tray compound impression and a cross section through the region of the first molars of the upper impression. A represents the metal tray and points. B represents the marginal turn of the impression.

All excess compound and overhanging compound is now cut away, as represented in *Fig. 11*.

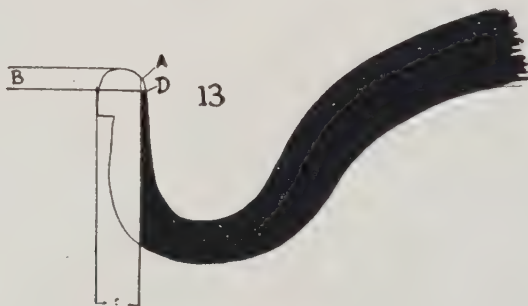


This will permit the compound impression to be removed from the metal tray. This metal tray will not be needed further, and the compound impression becomes the tray. *Figure 12* shows the compound impression removed from the metal tray.

Previously, it has been shown that compound will, and does, displace the soft marginal tissues in two directions, namely, upward and outward. These displacements are sure to occur, and must be corrected before the finished impression is taken. It also has been found that an accurately-fitting tray is a necessary and valuable adjunct to successful impression taking, because it necessitates a minimum amount of material and places and holds that material in its proper relation to the tissues until it hardens.

It will be noted on the compound tray that there is a definite roll, or turn, of the material, designating the approximate point of beginning of the soft tissue displacement. In *Fig. 12* this is represented by point A.

With a sharp knife the excess material is now trimmed away the approximate distance of the tissue displacement.



This is illustrated in *Fig. 13*. Here A represents the first appearance of the "turn." B represents the amount of upward tissue displacement, and C represents the amount of outward or forward displacement. Due to the trimming, the borders of the tray are now left more or less sharp, and next are to be rounded off by scraping with either a knife or vulcanite scraper, until they appear as repre-

sented by point D. This marginal trimming is done all the way around the borders from heel to heel.

Distal to the region of the first molar it is possible, and oftentimes advisable, to leave considerable width to the turn, in order to fill the coronoid space, but anterior to this point the borders should be trimmed as thinly as possible, approaching the thickness of cardboard, if the case will permit.

The question may here be justly asked: "How do you know just how much tissue displacement has taken place, and how much trimming is necessary?" There is no accurate method of definitely determining the exact point to which the case should be trimmed, because the impression gives you only a partial indication. This point, however, may be fairly well determined by putting the trimmed tray into the mouth and carefully testing the freedom of movement of the soft tissues over the borders of the tray. There is another check that will accurately determine whether or not the trimming has been sufficient. When the finished impression is taken and the borders of the tray have not been trimmed sufficiently, they will cut their way through the thin plaster and be forced into the soft tissues producing the original displacement. This is easily distinguished by the sharp contrast in color, showing where the black tray compound has cut its way through the white plaster.



Fig. 14

Figure 14 shows the finished compound tray and also an anterior-posterior and a lateral section showing the correct trimming of the borders. If there is a doubt in the operator's mind as to how high to leave the border, there is no objection to cutting it possibly one-sixteenth of an inch lower than the point indicated on the impression. If this is done, however, care should be exercised not to break off any of the thin plaster margins that might be lacking support when removing the finished impression from the mouth.

(To be continued).

A Tribute to Alma Mater

EDMUND T. GUEST.

Member of Graduating Class of 2T4, Royal College of Dental Surgeons of Ontario.

The following address was delivered at the Graduation Banquet of the Royal College of Dental Surgeons of Ontario, held at King Edward Hotel, Toronto, May 3, 1924:

MR. CHAIRMAN AND GENTLEMEN,—I feel that it is a very great honor and a very great privilege to say a few words in a tribute to the Alma Mater. As I say the words, *Alma Mater*, a variety of feelings surge up within me. A feeling of pride, in being a part of one of the finest Dental Colleges in the world; a feeling of gratitude and appreciation for all that our College has given us, and a feeling of responsibility for what we owe our College, the part that we must play in the life and work of the Royal College of Dental Surgeons.

I speak of a feeling of pride. Surely every one of you feels that same thrill of pride. When we think of the great work being done, and the honors being earned by graduates of our school, when we consider the recognition and standing enjoyed by College and her graduates, wherever dentistry is known, we are justified in feeling genuine pride at being a part of it all.

Probably the feeling is deeper, because we are, in a greater sense, more a part of our Alma Mater than the men of any other college, or any other profession. When we graduate, we do not leave the Alma Mater. But, rather, the bond becomes closed and more intimate. We graduate as members of the Royal College of Dental Surgeons, and during our entire professional lives, we will be part of the Alma Mater.

And, then, there is that feeling of gratitude and appreciation for all that the Alma Mater has given us. How can we speak of all that our college life has meant to us; the training and education; the men who have taught us so patiently; those who have worked with us; the friendships and associations; the good times and the bad times; moments of triumph, and moments of heart-breaking despair? All these things have gone to make up our college life, and, through it all, the Alma Mater has safely brought us. When we remember how we came in, and now consider how we go out, we realize that the Alma Mater has given us a very great deal.

That's the reason why we have that other feeling of responsibility. For four years the Alma Mater has given to us. Now the time has

come when we must give back to her. We must, I say, be ready to play our part in the life and work of the R.C.D.S.

Some will serve by coming back as teachers. They will give out what was given to them. Some will serve by bringing honor to the Alma Mater through the work that they will do. Just ten years ago to-night Harold Keith Box took part in a banquet just like this. And there are men in 2T4 who are going to honor their class, as he has honored his.

But most of us will serve simply by living the life, whether in dentistry or out of it, that will reflect credit on the Alma Mater, and will uphold the traditions made by those who have gone before. Men of 2T4, that is a definite responsibility, as well as a glorious privilege, and we must not fail! Remember always that whether we are in the East or the West, whether in America or on the other side of the world, we are always a part of the Alma Mater, and the world will judge our college by what we are and what we do.

Dean James Branston Willmott

THE next issue of ORAL HEALTH will contain a photograph of the portrait of the late Dean Willmott, to be unveiled in the College Building at the R.C.D.S. Alumni reunion, in connection with the Ontario Dental Convention.

The dental profession in Ontario cherishes the highest regard for the memory of Dean Willmott. As the years pass by the members of the profession appreciate more and more his great services to dentistry. Dean Willmott was a great man and an outstanding citizen. His strong personality and the elements of leadership possessed by him to such a marked degree frequently resulted in lack of co-operation upon the part of those who held contrary views. But as time passes, his constructive work for dentistry and for the Royal College of Dental Surgeons of Ontario is receiving greater recognition.

Pioneer days always produce the strong, rugged character best fitted to carry the burden of the hour. The late Dean Willmott devoted his life to dentistry, and gave the best he had. His contribution stands to-day as a great achievement for dentistry.

Along with the portrait will be published the address of his old pupil and friend, C. N. Johnson, with a historical sketch of the late Dean Willmott's life and work.

W.S.

GUTTA PERCHA.—If you do seal any treatment with gutta percha in a tooth, work a few strands of cotton wool into it first. It is more efficient, and resists wear better. This is also excellent for separating the teeth.—*L. C. Kent, in Dental Science Journal.*

Dental Nurse Graduates of the Royal College of Dental Surgeons

CAN a dentist afford to be without an efficient assistant? Should he be burdened by the details of running an office? Can he concentrate on the service to the patient when interrupted by the telephone, an agent, a patient, possibly in distress, or wishing to pay an account, or one of the many other things that may occur? Should he give his time to answering correspondence and collection of accounts?

All these details could be attended to as well, if not better, by the trained assistant. If the dentist desires, she may also assist him at the chair. She can save the dentist's time in every way, and leave him free to give his undivided attention to the actual dental needs of the patient. Every dentist knows that it is the time he spends at the chair which brings him returns. Therefore, it is in his interests to have an assistant who can look after the office routine and conserve his time as much as possible.

A training school for dental nurses was established by the Royal College of Dental Surgeons several years ago for the purposes of training young women to act as dental nurses. Last fall, from a considerable number of applications received, twelve young women were selected as apparently possessing the qualifications necessary to become an efficient assistant. At least two years at High School was required as preliminary education. These young women have attended the College for eight months, from 8.30 until 5.30 each day, and have received lectures and practical instruction in various subjects related to the dental office. They are not trained as dental technicians, but to assist the dentist in practically every other way.

The dental nurses have now completed their course, and on the 30th May will be awarded a diploma at the Commencement of the Royal College of Dental Surgeons in Convocation Hall. They are now available for positions, and if you have no assistant, or your practice is growing so extensive that you need another one, if you will write to the College and state any special qualifications you desire, the committee will be glad to recommend a dental nurse whom they feel will meet your requirements.—F. C.

Doctor Miner Appointed Dean

DOCTOR LEROY MINER has been appointed Dean of Harvard University Dental School to succeed Dean Smith, the appointment taking effect at the close of the present session.

Canadian Dental Association Convention, Vancouver, August 4th-7th, 1924

TRANS-CANADA OFFICIAL ROUTE.

FOR the accommodation of those attending the twelfth meeting of the C.D.A. the Transportation Committee have completed arrangements for the Special Train which will carry the excursion westward. This will be the finest and most enjoyable manner in which to see your own country. The special stop-over privileges and sleeping on your Pullman instead of hunting an hotel will be an added inducement.

The official route will travel *via* Great Lakes, C.N.R. to Prince Rupert, ocean steamer to Vancouver, through the finest scenic waterway in the world. Returning, the route will follow the C.P.R. through the mountains, where enjoyable days will be spent. The season of the year will be conducive to pleasure, and give one a good idea of the harvesting industry in our great West.

Several side trips may be taken from Vancouver by rail, boat or motor; a trip may be taken to Skagway, lasting nine days, through the fiords of the B.C. and Alaskan coast, viewing mountains, forested islands, ice-clad peaks, glaciers, and the purple twilights of Alaska. Round trip from Vancouver will be \$80.00 up.

As the steamers at this season are very crowded, the Committee should be notified as early as possible, so as to insure accommodation for any who may wish to make this trip.

The side trip to Victoria-Seattle-Portland may be studied from the itinerary printed below:

Motor trips abound in great numbers, and variety among the many parks and scenic groves.

FARE AND BERTHS TO VANCOUVER.

	C.N.R. Toronto to Van.	C.P.R. Van. to Toronto.	Return Fare.	Total.
Upper Berths	\$20.90	\$27.50	\$143.80	\$192.20
Lower Berths	26.15	34.40	143.80	204.35
Compartment	73.15	96.25	143.80	313.20
Drawing Room	92.40	122.10	143.80	358.30

Berths on the return trip will be reserved at Vancouver on the beginning of the return passage.

The itinerary of the excursion will have to be complete before leaving Toronto.

The itinerary follows below, and should be studied carefully.

OFFICIAL SPECIAL TRAIN TO VANCOUVER, 24th JULY, 1924.

Lv. Toronto	10.00 a.m.	Thursday, 24th July,	C.N.R.
Ar. Sarnia	3.45 p.m.	Thursday, 24th July,	C.N.R.
Lv. Sarnia	4.00 p.m.	Thursday, 24th July,	N.N. Co.
Ar. Port Arthur	6.30 a.m.	Saturday, 26th July,	N.N. Co.
Lv. Port Arthur	7.50 a.m.	Saturday, 26th July,	C.N.R.
Ar. Winnipeg	9.15 p.m.	Saturday, 26th July,	C.N.R.
Lv. Winnipeg	10.00 p.m.	Saturday, 26th July,	C.N.R.
Ar. Saskatoon	12.15 p.m. (noon)	Sunday, 27th July,	C.N.R.
Lv. Saskatoon	6.30 p.m.	Sunday, 27th July,	C.N.R.
Ar. Edmonton	8.40 a.m.	Monday, 28th July,	C.N.R.
Lv. Edmonton	12.30 p.m. (noon)	Monday, 28th July,	C.N.R.
Ar. Jasper Park	10.35 p.m.	Monday, 28th July,	C.N.R.
Lv. Jasper Park	8.40 a.m.	Wednesday, 30th July,	C.N.R.
Ar. Prince Rupert ..	4.30 p.m.	Thursday, 31st July,	C.N.R.
Lv. Prince Rupert ..	11.00 p.m.	Thursday, 31st July,	C.N. SS.
Ar. Vancouver	2.00 p.m.	Saturday, 2nd Aug.,	C.N. SS.

SIDE TRIP TO SEATTLE AND PORTLAND.

Lv. Vancouver	10.00 a.m.	Saturday, 9th August.
Ar. Victoria	3.00 p.m.	Saturday, 9th August.
Lv. Victoria	4.30 p.m.	Monday, 11th August.
Ar. Seattle	9.30 p.m.	Monday, 11th August.
Lv. Seattle	10.00 a.m.	Wednesday, 13th August.
Ar. Portland	4.40 p.m.	Wednesday, 13th August.
Lv. Portland	1.00 p.m.	Friday, 15th August.
Ar. Seattle	7.40 p.m.	Friday, 15th August.
Lv. Seattle	9.00 a.m.	Saturday, 16th August.
Ar. Victoria	1.15 p.m.	Saturday, 16th August.
Lv. Victoria	2.15 p.m.	Saturday, 16th August.
Ar. Vancouver	7.15 p.m.	Saturday, 16th August.

OFFICIAL TRANS-CANADA TOUR, CANADIAN DENTAL ASSOCIATION, VANCOUVER, AUGUST 4th-7th.

Lv. Vancouver	8.30 a.m.	Tuesday, August 19th,	Train No. 4.
Ar. Sicamous	10.25 p.m.	Tuesday, August 19th,	Train No. 4.
Lv. Sicamous	10.10 a.m.	Wednesday, August 20th,	Train No. 2.
Ar. Lake Louise	9.25 p.m.	Wednesday, August 20th,	Train No. 2.
Lv. Lake Louise	10.05 a.m.	Friday, August 22nd,	Train No. 4.
Ar. Banff	11.10 a.m.	Friday, August 22nd,	Train No. 4.
Lv. Banff	11.10 a.m.	Sunday, August 24th,	Train No. 4.
Ar. Calgary	2.05 p.m.	Sunday, August 24th,	Train No. 4.
Lv. Calgary	1.35 a.m.	Monday, August 25th,	Train No. 2.
Ar. Winnipeg	8.00 a.m.	Tuesday, August 26th,	Train No. 2.
Lv. Winnipeg	9.00 p.m.	Tuesday, August 26th,	Train No. 4.
Ar. Fort William	9.50 a.m.	Wednesday, August 27th,	Train No. 4.
Lv. Fort William	12.00 noon.	Wednesday, August 27th,	Steamer.
Ar. Port McNichol	8.00 a.m.	Friday, August 29th,	Steamer.
Lv. Port McNichol	8.30 a.m.	Friday, August 29th,	C.P.R.
Ar. Toronto	11.55 a.m.	Friday, August 29th,	C.P.R.

Approximate fares from points East of Toronto to Vancouver, will be as follows:—

Halifax	\$170.45	St. John	\$165.10	Fredericton	\$163.60
Quebec	\$144.10	Montreal	\$133.05	Ottawa	\$128.05

All of the above fares are good going *via* Toronto.

If lake trips are desired, add \$10.00 to fare for each trip, and for boat trip from Prince Rupert to Vancouver add \$13.00. Meals and berths included on all water trips.

C. ANGUS KENNEDY, *Chairman.*

Physicians & Surgeons Bldg.,
86 Bloor St. W., Toronto.

W. B. AMY,

147 Bloor St. W., Toronto.

Meet me at the Ontario Convention, May 26-29th, 1924.



A Walk in the Country

IT is easy to understand Thoreau's fascination for walking. I know of no pleasure quite equal to that of taking a long stroll out across the country—over hill and through dale—with no restriction of time or distance. To walk and walk as far as one wishes, and in any desired direction, to meander along leisurely or to step briskly, as the impulse dictates; to stop at times and sit on a log and look up at the tree-tops hanging overhead; to watch the boughs gently swaying and the leaves rustling. Ah! that is the personification of restfulness. And then to listen to the angry chatter of the red squirrel as he sits on a limb and scolds us in short, jerky sentences for our audacity in presuming to sit under *his* tree—the big, bushy tail curled over his back and his whole body vibrating with intense excitement—and as we take a stick and tap on the trunk of the tree for its effect upon him, to see him dart back and forth in perfect frenzy, his head turned to one side and peering down at us with small, beady eyes as he stops for a moment, with his sharp claws grabbing the limb, and raising his strident voice higher in increasing agitation—all the while resenting more and more our intrusion, till I am sure that by this time he is swearing outrageously—all this is life. And then, as we get up and walk away, to end this awful tempest, to see him rush to the trunk of the tree in triumph and start down with his body spread out over the bark, his tail high in air and his head looking out at us in saucy audacity, much as to say: "This is *my* tree, and that's what intruders get for coming around and disturbing *me*." It is all very human—very life-like—just as you and I would do if a monster came and sat at our doorstep, and we were as agile as the squirrel.

To turn toward the fields and stride forth with huge swinging step, pausing only long enough to pull up a vigorous growth of burs, as they are nearing fruition, or to examine the wondrous mechanism of an abandoned bird's nest and marvel at its design; to hold the

head aloft and drink in the fresh crisp air; to admit of no barrier—jumping over fallen logs, leaping across narrow creeks, and climbing high rail fences—only to find how much heavier one weighs than when a boy. I know of nothing more expressive of increasing weight than to feel the astonished thud with which one lands on the earth as one jumps from a rail fence. It is very chastening in its effect, and it sends one on the way with a resolve to cut down on the diet, and go into training. But all of this is forgotten by the time one has taken a long walk, and comes in with a ravenous appetite.

The leap over the fence lands us in the edge of a thick woods with the lush young underbrush springing up in rich profusion. What a marvellous provision of mother nature that when the older and more stately monarchs of the forest reach maturity and begin to feel the touch of disintegration and decay, the seeds are sown and the young sprouts are on their vigorous way to take their places. Surely there is a beneficence in all of this. And oh, the glory of those tall trees standing as sentinels over the bounty of nature, and waving their lofty banners for the delight of man and the protection of beasts. Nowhere in all nature is there anything more impressive or beautiful than a symmetrical tree.

To struggle with the dense underbrush, to tread on the soft carpet of dried leaves, to bend low at times and creep under the hanging limbs, to emerge into a clear space with the tall, slim, smooth colonnade of trees all around, like some great sonorous cathedral of nature—this is most impressive. He who has not stood in a woods like this can never realize the full grandeur of it or appreciate the spell.

And then to wander down a long slope into the swamp where the cedar, and spruce, and balsam, all mat together into the glorious evergreens of winter, starting up and surprising a brace of partridge, who go hurtling off with clamorous whir into the denser bush, and startling us with the suddenness of their flight. No matter how carefully we peep around among the bushes we seldom see that precious pair again—they know the woods better than we do. On one of the slopes we find a spring, scooped out by some thoughtful person, who has hung a tin cup on a branch. Somehow the drink from that spring after a long walk is finer than any other water.

Down a little farther we come to the winding creek—broad in spring, but narrow in summer—and if we sit quietly on its bank long enough, we shall see a slim, lithe mink creep out from under the overhanging bushes and play on the shore. We keep perfectly still, and watch the gambols of this graceful animal. What a fine hilarious life these little things would lead if it were not for their enemies—human and otherwise.

We turn back toward the clearing and emerge out in the pasture lot where the cows are grazing along the slopes, or lying contentedly

chewing their cuds. All the while we are treading the soft turf—not the adamant cement or stone of the city—and there is a sense of elasticity and springiness underfoot that makes one sprightly and youthful in spirit. We impulsively run up over knolls, and even climb the highest hills with a feeling of exhilaration.

We may come in a trifle tired, but it is the fatigue of muscles and not the exhausting weariness of overtaxed nerves—not the depressing, nauseous, enervation of long-continued city tension. We can afford to be tired physically, if we can thereby escape the penalty of over-strained nerves—the agony of a tortured brain. For a worn-out city man, there is no panacea like that of a long leisurely walk in the country—that is, if he loves the country.

C. H. Johnson,

Bureau of Standards, Washington

DENTAL RESEARCH.

A RESEARCH on the physical properties of dental materials as related to prosthodontia and orthodontia is now in progress in this Bureau. Apparatus and special equipment have been and are being assembled for the work. Tests are being made on the fundamental physical properties, such as: Temperature expansivity, distortions due to time or temperature or both, wax elimination, casting technique, elastic properties and heat treatment of gold alloys. This work is being carried on as a co-operative research in conjunction with the Weinstein Research Laboratories. The Bureau is in complete control, however, in directing the work and publishing the results.

Some data and information have been secured from the text books and journals of the profession. It is needless to say that many of these articles are contradictory. To facilitate the continuance and completion of the research we wish to receive additional suggestions from a number of those actively seeking the advancement of the science.

With this idea in mind the Bureau will be pleased to have comments upon the relative importance of the subjects in the accompanying outline indicating those calling for special attention and those of little importance, adding to the list wherever necessary. Replies should also give the results of any tests you may have made on these subjects, and especially any experiences you have noted in your practice.

Upon receipt of your reply, your name will be placed upon our list for such further co-operation as may be warranted by your interest

in the matter, and for whatever special or complete reports may be issued in connection with this investigation.

OUTLINE OF RESEARCH.

I. *Pattern Waxes.*

- (a) Working temperatures.
- (b) Investing temperatures.
- (c) Dimensional changes.
- (d) Compensation for other defects.
- (e) Elimination from mold.
 - 1. Burning out partially. 2. Burning out completely. 3. Elimination by boiling and heating, etc.
- (f) Subsequent surface condition of molds.

II. *Investments.*

- (a) Ratio of plaster, silica, etc.
- (b) Mixing technique.
- (c) Dimensional changes.
 - 1. Due to time. 2. Due to temperature.
- (d) Strength (ultimate compression).
 - 1. Cold. 2. Hot.
- (e) Porosity.

III. *Gold Alloys for Casting.*

- (a) Chemical composition.
- (b) Micrographic studies.
- (c) Casting technique and equipment.
- (d) Melting ranges.
- (e) Effect upon surface of molds.
- (f) Casting shrinkage and other defects.
- (g) Elastic properties for clasps, etc.
 - 1. Deflection under stress. 2. Set. 3. Tensile strength and hardness. 4. Resiliency values.
- (h) Life tests (repeat stress) for flexure of cast clasps, etc.
- (i) Heat treatments of castings.

IV. *Gold alloys (wrought) for Prosthodontia and Orthodontia.*

- (a) Chemical composition.
- (b) Micrographic studies.
- (c) Melting ranges.
- (d) Annealing temperatures and methods.
- (e) Solders.
- (f) Elastic properties for clasps, arches, springs, etc.
 - 1. Deflection under stress. 2. Set. 3. Tensile strength and hardness. 4. Resiliency values.
- (g) Life tests (repeat stress) or flexure.
- (h) Heat treatment of completed appliances.

V. *Impression and Cast Materials.*

Including Plaster of Paris, Modelling Compound, Wax, Artificial Stone, Fusible Metal, etc.

ORAL HEALTH

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Vol. 14

TORONTO, MAY, 1924

No. 5

EDITORIAL

Has a Regularly Qualified Physician the Legal Right to Practise Dentistry?

THIS is a question that has been the occasion of considerable interest and discussion in the professions of both dentistry and medicine.

Broadly speaking, it would seem that, where there exists no special statute to the contrary, a duly licensed physician, by virtue of the power conferred upon him, has the right to perform any dental operation for his patients.

However, where there are two special statutes governing the practice of medicine and dentistry, and no clause in the Dental Act excepting the physician from the restrictions therein, there have been recorded different opinions by different judicial authorities.

Leslie Child, in his "Law for the Dentist," illustrates this difference of interpretation by instancing two test cases, one in the State of Rhode Island and the other in Minnesota, in which two opposite opinions were recorded.

In Rhode Island, the court construed the Dental Act as except-

ing physicians from its operations, reasoning that the sphere of operations of the dental surgeon was included in the larger one of the physician or general surgeon.

On the other hand, the Minnesota court held that where two professions are regulated by separate and distinct statutes, they are legally two distinct callings, and therefore, no implied exception could be held to exist in favor of the physician.

However, as has been previously intimated, the preponderance of opinion is in favor of the physician being quite within his legal rights in treating any lesions of the teeth and oral cavity.

In the Province of Ontario there is a clause in the Dentistry Act which reads. "Nothing in this Act shall affect or interfere with the rights and privileges conferred upon legally qualified medical practitioners by the Ontario Medical Act."

This clause places the exemption of the medical practitioner quite beyond the region of doubt as to his right to perform any necessary dental operation for his patient.

However, in the writer's opinion, this does not mean that the physician or surgeon in Ontario has the legal right to publicly or otherwise announce himself as a regularly qualified dentist, and under such title carry on a dental practice. Such an announcement and procedure would be contrary to the facts and would at least leave the physician open to a charge of fraud or misrepresentation.

R. G. McL.

Obituary—Dr. Richard Arthur Revell

FOLLOWING an illness of only three days, Dr. Richard McArthur Revell, Canada's oldest working dentist in point of years and of service, and one of Woodstock's pioneer residents, passed away on April 7th, within a few days of his ninetieth birthday.

Dr. Revell attended the Cincinnati Dental College in 1859, and after practising in that city and in Marion, Ohio, and Peru, Indiana, he returned to Woodstock and opened an office there in 1862. He has been in business as a dentist constantly since that time.

Dr. Revell served for some years on the Woodstock Town Council, and later on the Woodstock Water and Light Commission.

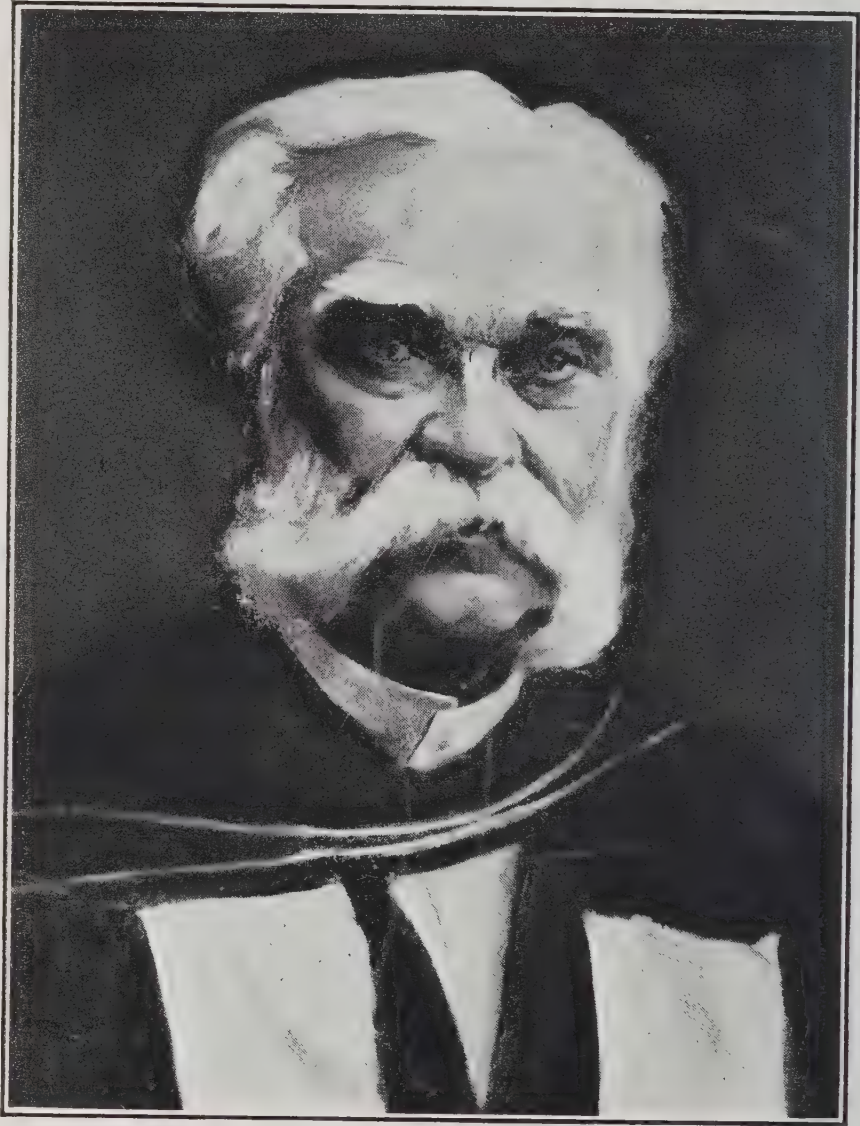
Meet me at the Ontario Convention, May 26-29th, 1924.

The Set of the Soul

ONE ship sails east and one sails west,
By the self-same wind that blows.
It's the set of the sail and not the gale
That determines the way it goes.

Like the winds of the sea are the ways of fate,
As we journey along through life;
It's the set of the soul that determines the goal,
And not the stress nor the strife.

—*Selected*



PORTRAIT OF THE LATE
JAMES BRANSTON WILLMOTT, L.D.S., D.D.S., M.D.S., PH.D.
LATE DEAN, ROYAL COLLEGE OF DENTAL SURGEONS OF ONTARIO,
TORONTO.

ORAL HEALTH

A JOURNAL THAT STANDS FOR THE "OUNCE OF
PREVENTION," AS WELL AS THE "POUND OF CURE"

Vol. 14

TORONTO, JUNE, 1924

No. 6

Address at the Unveiling of a Portrait of the Late Dean James Branston Willmott

By C. N. JOHNSON, M.A., L.D.S., D.D.S., M.D.S., F.A.C.D.,
CHICAGO, ILLINOIS.

MY FRIENDS: The very great privilege and the esteemed honor of appearing before you in my present capacity can be appreciated only by those who in life had an intimate acquaintance with the unique personality of the man in whose honor this present function is held. Coming from the humble home of a farm, hedged about by the limitations of a more or less narrowed environment, handicapped by uncertain health, and gripped by the palsyng hand of an intolerant age, he emerged by the sheer force of his genius into the bigger and broader world of achievement and distinction. His was not the heart to be daunted by the "slings and arrows" of misfortune, his was not the brain to be bowed down by discouragement. Temperamentally unsuited for the unworthy task of truckling to the crowd, he raised his head in fearless contention for what he believed to be just and right, unswerved by the clamor of the masses and unaffected by the plaudits of the people.

Men are judged not so much by the glory they have gained, not so much by the wealth they have acquired, not so much by the circumstance of pomp or pride, as they are by the things they have said and done. In the alembic of what we call a human life, where the dross and gold are weighed and measured by the rigid scales of time, we look upon the product with unerring eyes, and yield the palm to purity and worth.

Out on the horizon of every man's domain there lurk the skulking

*Delivered at the Royal College of Dental Surgeons, Toronto, May 26th, 1924.

forms of envy and deceit, and blest be he who looks beyond and sees the clearer air of human love and hope. In the activities of life one thing stands out supreme and sure—the sacredness of service. When men meet men in human weal or woe, the test of character comes, not in the impulse of the fleeting hour, but in the calm and steadfast poise of days, and months, and years.

As an exemplar of all that was stable and secure in human conduct, the late Dean Willmott loomed aloft among his fellow men. Reared in an atmosphere of probity and truth, he never deviated from the straight and narrow path, nor swerved to right or left to please a passing whim. Cradled in the lap of sincerity, he never knew nor felt the subtle urge of craftiness or guile. Sturdy in his convictions, steadfast in his creed, he stood four-square to the world, undaunted and sublime. He never catered to the clamor of the crowd.

He scorned a hypocrite, and had little charity for the moral coward. His mental grasp could never make him see why men should be afraid of doing what was right. He never strove to be popular—seeking rather to do the thing that was just, in preference to the thing that was expedient.

In the practical affairs of life he had a clear vision and an acute intuition, and his judgment of men and measures was unerring. He saw far into the future, and builded better than most men knew. In this respect his service to the profession of his native land was beyond price. In a day when dentistry in Canada had no status in the public mind, when legislators frowned upon any recognition of it, when the cultured class looked down upon it as something mediocre and banal, when to be a dentist was to be classed with tinkers and tradesmen, when the traditions of our calling were yet largely in the making—in this chaotic condition of affairs Dean Willmott stepped into the arena of professional activities and took up the cause of a bigger and better dentistry for the people of his beloved country. He saw what few men saw at that time—the possibilities of the future—and the one outstanding thing in his professional career was the organization and development of that wonderful institution under whose roof we are meeting to-day to pay homage to his blessed memory.

Emerson has said that “every great institution is but the lengthened shadow of one man,” and if this be true, then we may in all sincerity affirm that the Royal College of Dental Surgeons represents the far-seeing vision and the organizing genius of James Branston Willmott. I find it impossible to think of this splendid institution, and of its wondrous growth without thinking of Dean Willmott. His activities are knit into the very fibre of its stable fabric, and so long as its history is recorded in the minds of men, his name will be linked in loving memory with all that is highest and best in its early development. The profession of this Province owe their homage to his honored name,

and it is altogether fitting that they should seek to perpetuate his fame by acts such as that embodied in the present function of placing his portrait on its college walls.

I never step into this building and see the commemorative window at the head of the stairs that I am not sanctified and made a better man thereby. I never think of Toronto and my early days in college that I do not think of Dean Willmott as the dominant factor in my professional education. I never think of my own initial efforts as a dental teacher that I do not recall his fatherly and friendly advice. And what he has been to me he has been to countless others. His example to the student body of this Province has been one of the outstanding factors in the development of professional morale among the recent graduates, and no one can estimate to-day the full effect of what this has meant to dentistry in Canada.

Only by unselfish sacrifice on the part of our leaders can the profession of any land be brought into the full fruition of its function, and when the sum total of the devotion of such men as Dean Willmott is measured in terms of constructive achievement, it will be found to represent nearly all that has been accomplished in our professional progress.

After all, the greatest value of a teacher is expressed in the example he sets before the students—not only his example in the classroom or laboratory, but chiefly the example of his daily life. Students are never deceived about any man for any length of time. They know whether or not he leads the right kind of life without being told. Their intuition is keener than that of a given number of adults, and they are usually unerring in their estimate of a man after sitting under his teaching for even a brief period. Thus it happens that the everyday life of Dean Willmott has meant much to the rank and file of the profession who have gone through this institution, and thus it is that there is a higher moral tone among Canadian dentists as the result of their contact with this man.

Linked with the advancement of every science and art are the names of a few outstanding pioneers, and in all the category of men who have come and gone in the annals of Ontario, there never was one who left his impress more indelibly on any calling than did Dean Willmott on the dental profession. Buffeted a bit by fate, and sometimes attacked by those who did not understand his motives, or were incapable of grasping his vision, he went heroically on to the fulfilment of every task, and the fruition of every worthy project. Struggling sometimes against odds that seemed overwhelming, he kept his eye constantly on the ultimate aim of his efforts, and never faltered till the end was attained.

In the flotsam and jetsam of life, in the ebb and flow, in the ceaseless throb and beat of circumstance and chance, we are bombarded

by every adverse wind that blows; and courageous indeed is he who can bare his brow to the blast, and turning his face toward the glowing light, go bravely on to the end of the winding road. Dean Willmott typified the best there is in our pioneer and civilized life. He knew what it was to root out the rugged and tangled undergrowth, to blast the rocks, and to place the plow for the first time in virgin, untried soil. He took the field fresh from the hands of nature, and tilled it to the fruitage of blossoming flower and bursting grain. In his professional achievements he made two blades of grass grow where only one had been, and he who can do this has been accounted a creator. Different men in this country may have in part approached his stature. Mayhap there have been some who could organize as well as he, mayhap others who could teach as well, others may have been as successful in practice, and still others with as much business acumen; some there may have been who walked as straight a moral path, and we may imagine some who were to the community as good a citizen. In each of these varied and several activities of life, he may have had his counterpart, but to my mind there has never been a man in the whole history of dentistry in Canada who has combined in one individual all these attributes to the same degree as did Dean Willmott.

It was not enough that he should devote himself to his own particular problem—he must needs take on his shoulders the problems of his profession. Individual achievement is rare enough to be remarked—it stamps a man as great among his kind—but he who stands out in bold relief above his fellowmen is he who achieves for others more than for himself.

Mere goodness is a worthy virtue, but goodness with genius is greater still. A man may be negatively good and be well-nigh a nonentity, but he who is constructively good and combines with this the ability to apply this goodness to the practical affairs of life is the one who, after all, is the greatest asset to his age and generation. Dean Willmott was not only a good man, but he had the superlative ability to make use of this goodness in the tangible betterment of his fellowman.

We are here to-day to place on permanent record our appreciation of the service he rendered the profession and humanity at large. We bring to the shrine of this institution, rendered sacred by the devotion which he gave it during his life, this tribute of our homage and our love. We reverently place upon the college walls this likeness of the man whose each unselfish act of life is mirrored in our minds; and to-day as we gaze with tear-dimmed eyes on the familiar features of the man we had learned to love, we consecrate ourselves anew to that service which he embodied in his daily acts, and to that high ideal which formed the motif of his long, eventful life.

And now, my friends, in loving memory, and in reverent awe, I unveil this portrait, and commit it to the care of those in whose keeping the destiny of this institution is to be reposed for all future time; and I commend it to the consideration of each and everyone who may in all the years to come find themselves within these college halls—I commend it as a beacon light pointing the way for young and old to a purer, rarer, and better life.

Biographical Sketch of the Life of Dean James Branston Willmott, 1837-1915

JAMES BRANSTON WILLMOTT, one of three brothers, was born on a farm near Milton, June 15, 1837. When only seventeen years of age, he entered Victoria University at Cobourg, intending to complete the Arts Course, but was compelled at the end of his first year to abandon this idea on account of ill-health. He had a great desire to study law, but in those days "law" was not regarded as a strictly honest calling, by the very pious country folk, as were his parents, so he entered upon the study of dentistry, although he always took a keen interest in, and always had a longing for, "law". There is no doubt that with his very clear and logical intellect he would have made a brilliant success "at the bar."

He early distinguished himself, as after studying with the late W. C. Adams of Toronto, he practised dentistry, conducted a drug store, was magistrate and town councillor before he was twenty-three years old.

With the taste for "law", as mentioned, while in Toronto with Dr. Adams, he spent all the time possible, especially his lunch hours, in the Law Courts. In this way he accumulated a vast knowledge of legal lore and procedure, which in after years proved exceedingly useful to himself and to others. When the dentists of Ontario began an agitation looking towards the organization of the profession, Dr. Willmott was in the forefront and had no small part in framing the Act of Incorporation which passed the Ontario Legislature in May, 1868, and which was the first efficient Dental Act in the world, and, with the various amendments since made, has been adopted by many communities and is regarded as one of the best in existence.

Wishing to become as proficient as possible in his life calling, he attended the Philadelphia Dental College, graduating in the spring of 1871, with the degree of D.D.S. He had so impressed his classmates with his ability and character that they unanimously chose him as the valedictorian. He also passed the examination before the Board of Regents of the State of New York, and received the degree of M.D.S. Nearly twenty years after this, another graduate of the

R.C.D.S. also tried this examination and made such a high grade in Anatomy that the examiner made the remark, "I have never heard such an excellent examination since I examined Willmott of Ontario, a great many years ago."

In July, 1871, Dr. Willmott was appointed Secretary of the Board of Directors of the Royal College of Dental Surgeons, and removed to Toronto. On leaving his native town, the whole population joined in expressing their regrets in a very tangible and delightful manner. Three years later the Board requested him to conduct a private class of instruction for those wishing to present themselves for examination for license to practise in Ontario. This was a very strenuous undertaking—for one person to teach the whole curriculum, even of those days—and many gallons of midnight oil were consumed in preparation for the instruction. The gratitude of the class expressed tangibly, verbally and in writing, was sufficient gratification to compensate for the time and energy spent. This midnight habit of study and work remained with him to the end.

When the Board finally decided to establish a School of Dentistry, they appointed Dr. Willmott as Dean, and requested him to proceed with the organization, guaranteeing \$150 a year for rent and equipment. Associating with himself Dr. Luke Teskey, a dentist in his final year at Medical School, the first class met in November, 1875. Two years later Dr. W. T. Stuart was added to the staff, and in 1889, Dr. W. E. Willmott. Up to 1892, the former three gentlemen owned and managed the school, dividing the surplus which, for several of the early years, was a decided deficit. At this time the School was reorganized, the Faculty enlarged and the management assumed by the Board, who engaged the staff on salary and set aside the surplus with which to erect a suitable building.

Due largely to the efforts of Dr. Willmott and Vice-Chancellor Mulock, the College was affiliated with the University of Toronto, in 1888, Dr. Willmott becoming the representative from the College on the Senate, a position which he held until his death. Having kept himself abreast of the educational needs of the time, he was enabled to take a modest but honorable and weighty part in the wider educational movements of the Province. Hence his presence on the Senate was regarded by his associates as a valuable influence in all discussions pertaining, not only to affairs of dentistry, but also to other departments of education.

The commemorative window in the College Building, an expression of the affection and confidence of the profession in Ontario on the occasion of the completion of 50 years in practice, was unveiled at a complimentary banquet tendered to Dr. Willmott during the annual meeting of the Ontario Dental Society in May, 1909. Several prominent practitioners from different points in the United States

were present to extend their felicitations to one whom they respected and admired.

The first dentist to be granted the degree of Doctor of Laws by the University of Toronto, was Dr. Willmott, who modestly accepted the honor as a recognition of the profession more than of himself personally.

Concurrent with his regime as a dental educationalist, has grown up the Art and Science of modern Dentistry and, while not active in the inventive field, he was, through a long life, instrumental as no other man in Canada, in spreading the soundest principles and facts of dental development among students and professional men. When the Dominion Dental Council was formed, his sound judgment and great foresight were sought and he was made an advisory member of the Council, not being eligible as an active member on account of his connection with a Dental College. At the first meeting of the Canadian Dental Association he was unanimously elected President.

His fame was not limited to Ontario or even to Canada, as he was a familiar and welcome figure in various Dental Societies across the line. He represented the Royal College of Dental Surgeons in the National Association of Dental Faculties for twenty-two years, where his keen insight and good judgment were recognized by his being appointed on many committees in that organization and being elected President for one term, which office he filled with great credit to himself and profit to the Association.

In England his name was also known, as, while on a visit to Europe in 1906, he was invited to address the British Dental Association, and his services to the profession were recognized by his being elected an honorary member of that organization, the first Canadian to be so honored.

Although, as the result of an accident in early years, from which he was a constant sufferer through his entire life, he was debarred from taking any active part in young people's sports, nevertheless he was greatly interested in all the athletic activities of the students, and was frequently an enthusiastic spectator at Inter-Faculty contests.

Shortly after taking up his residence in Toronto he joined the Canadian Institute, where his executive ability was early appreciated, resulting in his being on many active committees, and in a short time being elected President.

In September, 1864, Dr. Willmott was married to Margaret Bowes, also of Milton. "This happy union was a pure idyll, for their lives were closely knit together in love and unswerving loyalty to the highest Christian ideals."

In the affairs of State, Dr. Willmott took an active interest. While residing in Milton, he was a magistrate and town councillor. After moving to Toronto he became identified with the Liberal organiza-

tion and threw his energies into a political campaign in the interests of the Liberal candidate for the Federal House. His candidate was elected, but later unseated on a technicality.

In the second contest, his efforts were increased, as he considered they had been unfairly treated. On this occasion they were defeated, and when Dr. Willmott ascertained they had driven more voters to the polls than they had polled votes his unshakeable ideas of integrity were so shocked by the dishonesty of the electorate that he abandoned active politics.

Reared in a deeply pious home and subject to all its sacred influences he entered upon a career of usefulness and achievement as a layman in the Church. On his twenty-first birthday he entered in his account book a covenant with God and his resolve to dedicate to Him at least one-tenth of his income (somewhat unique for the year 1858) and most faithfully was that vow kept, for however limited his income during his early professional struggles, God's portion was never curtailed, and in later years, nearly doubled. He took a deep and intelligent interest in all Christian work, and was ready with time, talents and purse, to give material support to every worthy cause. During fifty-three years he served the Methodist Church in every official position open to a layman. In his home town Church he had been a Sunday School teacher, Sunday School superintendent and trustee. On moving to Toronto his consecrated abilities were quickly recognized, and he was eagerly sought to fill similar positions. On the opening of the Metropolitan Church in 1872, he transferred his membership, and till his death was a loyal and earnest member and official, being a Class Leader, Sunday School Teacher and Trustee for thirty-five years, and Treasurer for twenty-one years. In all these religious activities he was earnestly supported by his beloved wife, who was also actively engaged in the various Women's organizations, and is still a teacher in the Sunday School, now completing her fifty-second year in that capacity, and was for twenty-seven years President of the Women's Missionary Society of the Toronto Methodist Conference.

"As a class leader he was spiritually minded and faithful; as a Bible class teacher he was without a peer, and believed that Bible study was the great need of our spiritual life."

"One of the ablest of instructors, he not only felt the interest which always attaches to dealing with the young and inquiring minds, but also the joy of setting before them all that is vital and fundamental in Biblical religion and in the Christian life." "To this hour hundreds of men remember him with gratitude and affection, not only for his instruction in the class room, but also for his teaching in the Sunday School and his guiding of their feet in the way of Truth and Life."

He loved the doctrine and polity of his Church and because of

his intelligent and life-long devotion to the Church and its work, he was continuously, since 1858, a lay member of the Toronto Conference, and a member of the General Conference in 1880, 1884, 1888, 1902, and in 1906 retired in favor of his son, who has been a member since that time.

"His dignity and strength of character, his modesty and absence of all assumption, his general knowledge, good sense, sound judgment and eminently practical mind made him an expert and accomplished guide in ecclesiastical legislative councils." His sympathies were not confined to Methodism. He was a Catholic Christian and an ardent advocate of Church Union and anticipated its speedy consummation.

During the spring of 1915, his health was broken, but he went on with his work, sustained by his indomitable will, until late in May he underwent an operation. Matters proved more serious than anticipated and the best medical skill and most careful nursing proved unavailing, and Dr. Willmott passed quietly and peacefully to his reward on June 14th, 1915, being one day less than seventy-eight years of age.

From the many expressions of sympathy, the following characteristics, among many, as viewed by his friends are gathered: "He had the faculty of seeing further into the future, the result of a policy or action, than anyone with whom I have come in contact." "His genuine brotherliness, his magnetic personality, his quickness to see the humor of a situation, his charm as a raconteur combined with his sturdy, manly Christian character, made him a singularly lovable and companionable man."

"Trained from youth to habits of study, a wide and careful reader, essentially a deep thinker with a marvellous memory, he amassed a wealth of knowledge which he ever turned to practical account." In accumulating this wealth of knowledge, who can estimate how much he was inspired by a letter written to him while at Victoria College in December, 1856, by a former pastor, evidently in answer to a request for guidance in the choice of a calling? The writer of this sketch was privileged to see this letter, and makes this quotation: "Mind your studies, be diligent, persevering, resolute; be determined if you have a mind to make it hold something, load it with the precious lore of scientific, moral and religious truth. Never be afraid of putting too much into it; ever remember that the mind is an elastic substance, so that the more you put in, the larger its capacity becomes for retaining knowledge; crowd all into it therefore (that is good) that you possibly can. You will find all useful in after life." What excellent advice! and how faithfully followed!

"He was a power among his confreres in association and College work." "He was a man of international reputation, whose splendid achievements in upbuilding the profession and the Colleges of his

country were recognized and appreciated." "He will ever be remembered as the foremost leader in Canada, the upbuilder of associations, and the most potent factor in Dental Education."

The funeral was conducted by the pastor of the Metropolitan Church, Rev. J. W. Aikens, and Rev. Dr. Briggs, a life-long friend, and though of a private character, was attended by representatives from all walks of life, all the members of the Dental Faculty and of the Senate who were in the city being present.

At the Alumni Reunion, held in the College building during the Ontario Dental Convention in May, 1924, Dr. C. N. Johnson, a graduate of the R.C.D.S. and a close and dear friend, unveiled a portrait of the late Dean, which the Board of Directors had painted as a permanent token of confidence and respect for one who was Dean for forty years, and for the latter part of this period was, in point of service, the senior Dental Dean of the world.

Unveiling and Dedication of Memorial Tablet

ROYAL COLLEGE OF DENTAL SURGEONS OF ONTARIO.

*Monday, May the Twenty-sixth,
nineteen hundred and twenty-four,
at Seven o'clock p.m.*

THE Honorable Mr. Justice Logie, C.B., unveiled and dedicated the Tablet following a brief address. There were present the commanding officer and officers of headquarters staff of Military District No. 2, and Lt.-Col. Thompson, and members of the Canadian Army Dental Corps.

Major the Rev. Canon C. W. Hedley, M.A., read the Scripture lesson, and offered the sentence and prayer, after which the last post was sounded.

Captain Roy Zimmerman acted as chairman of the Committee on Arrangements in connection with the unveiling.

(See illustration of Tablet on opposite page.)

All works of quality must bear a price in proportion to the skill, time, expense and risk attending their invention and manufacture. Those things called dear are, when justly estimated, the cheapest; they are attended with much less profit to the artist than those which everybody calls cheap. Beautiful forms and compositions are not made by chance. A composition for cheapness and not for excellence of workmanship is the most frequent cause of the rapid decay and entire destruction of arts and manufactures.—*Ruskin.*



MEMORIAL TABLET
Royal College of Dental Surgeons of Ontario.

Full Denture Construction for the General Practitioner*

BY I. LESTER FURNAS, D.D.S., CLEVELAND, OHIO

*Professor of Prosthetic Dentistry, Dental School,
Western Reserve University.*

(Continued from last issue.)

UNDERCUTS.

OCCASIONALLY a case will be found where there are deep undercuts in the region of the posterior tuberosities or at some other point. If the undercut is sufficiently deep to interfere with the placement of the denture it is certainly a case for surgical interference. It is a comparatively easy matter to make an incision and cut away the process causing the trouble.

If it is deemed advisable to secure an impression of the undercut it is best accomplished by preparing the tray in the manner just described and then cutting small semicircular grooves to permit the soft plaster of Paris to be forced through these openings and completely fill the undercut.

When the finished impression is removed and the plaster of Paris fractured at the points mentioned, the bulk of plaster thus obtained makes it much easier to reassemble the parts than it otherwise might be if there was only a thin film of plaster of Paris present. Undercuts in any other part of the mouth may be treated in the same manner.

SOFT OR ROLLING RIDGES.

In the upper arch the soft or rolling ridge frequently causes the prosthetist considerable embarrassment and worry. The great majority of these troubles is caused by one or the other, or a combination of the two following conditions: *first*, displacement of the soft ridge in taking the impression; or, *second*, a padding or cushioning effect of the soft ridge tissues underlying the base during the stress of mastication.

The second difficulty is best overcome by balancing the articulation. This will be discussed under the chapter heading "Articulation and Occlusion."

The first condition may be remedied by taking the impression in the following manner: The metal carrier or tray is selected and fitted as for any other case. The tray compound impression is taken and the borders treated as previously described. Special care is taken in

*Copyright 1924 by I. Lester Furnas.

seating the compound impression to see that the pressure is directed against the soft ridge so as to displace it upward and outward.

With a small vulcanite scraper, such as the Wilson No. 4, the tray compound impression is cut away so as to allow the ridge to fall freely back and resume its natural position when the compound impression is in place in the mouth. The next step is to proceed with the finished impression. Before going farther let us consider a few practical points about plaster of Paris as a material for taking impressions and something regarding its uses and abuses.

PLASTER OF PARIS—ITS USES AND ABUSES.

It is very much to be doubted if there is anything connected with dentistry that is easier to do than to make a mix of plaster of Paris. It is also very doubtful if there is anything that is abused quite so much and so often manipulated wrongly, and yet it is just as easy to mix it correctly as it is to mix it incorrectly.

There are few men practising dentistry who have not at some time in their practice had the following experience in using plaster of Paris for impression taking:

A patient presents for whom it is desirable to take a plaster of Paris impression of some kind. The plaster of Paris is mixed and carried to the mouth and seated. It soon hardens or "sets" and is removed. Nothing unusual at all. Some time later, possibly the same day, another patient calls who requires the same kind of work. The same kind of plaster of Paris is used, the same quantity of water and identically the same technique is followed. The plaster of Paris is placed in the mouth and held there for a long time, but it refuses to set, at least for a period of time very much longer than usual. The impression may even have to be removed and the mouth cleaned out and another mix made. What is the trouble? It easily can be demonstrated by the following experiment:

Take a plaster bowl and draw from the faucet a certain amount of water. Add to this water a definite amount of plaster of Paris. Spatulate for a definite length of time and place on the laboratory bench. By testing with the Gilmore needles there will be found, for example, an initial set of thirty-five seconds and a permanent set of two minutes.

Now take the same plaster bowl and draw from the faucet exactly the same amount of water. Add the same amount of the same kind of plaster of Paris and spatulate the same way for exactly the same length of time. Pour out in the same manner and test in the same way with the same Gilmore needles and you will get an initial set of two and one-half minutes and a permanent set of from eight to ten minutes. What is the cause of this wide discrepancy in the setting time of the two identical mixes?

When the first mix was made the water drawn from the faucet was approximately at room temperature, or let us say for example, 65°F. During the interval of time between the two mixes some one wanted a good cold drink and had let the water run for a time so that when the second mix was made the water was very much colder or, let us say, approximately 40°F. Therefore, if consistent results are to be obtained, water of approximately the same temperature always should be used. Taking the temperature of the water for each mix of plaster of Paris is by no means advocated. This would be very impractical. Later, two plans will be offered whereby this difficulty may be overcome in a very practical and convenient way.

The expansion of plaster of Paris is a subject that has received a great amount of attention in dental circles ever since its introduction into the field of dentistry. The manufacturers of dental plasters have taken advantage of this fact and have laid great stress on this point. There is little doubt, however, that with the high grade impression plasters procurable to-day, and considering the very small amount of material used in taking an impression, the element of expansion amounts to practically nothing when the proper technique of mixing is employed. The author has found it impossible to measure or record any expansion in masses of plaster of Paris one-eighth of an inch thick, which is thicker than need be for an average plaster of Paris impression. All plasters can be *forced* to expand if faulty technique is employed in mixing. This can be demonstrated very nicely by the following experiment:

Take two glass beakers and label them No. 1 and No. 2. Ask some one to designate which of the two beakers you shall break by the plaster of Paris expansion. We will say, for example, that No. 2 is chosen. Now take a large plaster bowl and make a mix of plaster of Paris sufficient to fill the two beakers, and as soon as the mix is completed fill them with the plaster of Paris by pouring from the bowl. In very few minutes No. 2 beaker will crack and break while No. 1 may stand for hours without breaking, and perhaps not break at all. The secret of it all lies in the spatulating or mixing. The mix is carefully spatulated to the point where the plaster of Paris shows the first sign of "body" or "set" and immediately beaker No. 1 is filled. This is a correct mix and little or no expansion will result. Before filling beaker No. 2 the bowl is worked around in the hands and possibly spatulated a little in cleaning out the bowl and filling No. 2 beaker. This *over spatulation* forces the expansion, hence the breaking of the beaker. Therefore never spatulate a mix of plaster longer than is absolutely necessary.

There are many different materials that may be used to hasten the setting of plaster of Paris, and these are known as accelerators. Potassium-sulphate, sodium-sulphate, alum, and sodium chlorid are a few

of these most generally used. Sodium chlorid (common salt), I believe, is by far the most popular, but is far from being the best. From a dental standpoint, pulverized potassium sulphate (K_2SO_4) ranks far in advance of all the rest. It will produce the desired hastening effect in less time. It will reduce expansion to a minimum. If the impression can not be boxed and the cast poured at once, and the impression must lay untouched for a few hours, it does not take on the frosted and mouldy appearance, but develops a smooth, glazed surface making the cast much smoother.

Sometimes the dentist experiences great difficulty in obtaining this material in the *pulverized* form and is forced to use the crystals. In this case the same results can be obtained by making a saturated solution and keeping it tightly sealed in a fruit jar or similar container, and using this stock solution in the mix. A definite technique for using this material will be described in detail under a later heading. All accelerators have a tendency to produce a softer set of the plaster of Paris, or what is sometimes referred to as "rotten plaster." This is also a decided advantage, because where it is necessary to fracture the plaster in removing it from the mouth, the removal may be more easily accomplished.

(To be Continued.)

Mutual Co-operation Between Medicine and Dentistry Absolutely Essential*

DR. LESLIE MCINTYRE, EDMONTON.

ACCORDING to tradition, dentistry and medicine had a common origin among the early Egyptians, when there were "practitioners for the eyes, those of the head, some for the teeth, and others for the belly and for occult maladies." Through the later centuries the development of medicine kept on steadily, while dentistry was treated by the parent profession with the condescension bestowed upon dissenters; with the development of group practice, preventive medicine, and preventive dentistry, and the recognition that this prevention is the ultimate goal of each, it is necessary that the two professions approach more nearly to the road from over which they both began.

About 1840, Drs. Hayden and Harris approached the Baltimore College of Medicine to include dentistry as part of its curriculum. This was refused. Nothing daunted, these men established the first dental school. At first it was considered a great disadvantage to be thus separated, but it was really a tremendous advantage. Un-

*Paper read before the Edmonton Medical Society in March and before the Edmonton Dental Society in April, 1924.

hampered by the parent profession in America, dentistry has advanced far beyond dentistry in those countries where the medical school is supreme. After years of separation we are now drawing closer on a plane of specialization. We have either to be rejected as a menace or accepted as a working part of the medical machine.

Commencing as a poverty-stricken profession, ignored, or at least merely tolerated by medicine, dentistry, through lack of funds, had to content itself with work of a reparative nature only. Though acting as guardians over the greatest avenue of infection for the human organism, research by dentists, except in a very small way, had to be ignored entirely. Of late, in our own professional time, in fact, a complete change has taken place. Handsome donations have resulted in a greater effort along a new line—that of the prevention of disease through the training of dental hygienists, who keep mouths healthy and clean by means of oral prophylaxis. This is primarily a child problem. Classes are being graduated in Boston, Philadelphia, Rochester and other places. At Bridgeport, Conn., the original home of this work, statistics have been kept, and, as a result, a remarkable reduction in all communicable diseases of childhood have been shown.

As dentists, we are often accused by physicians of overstepping our rights and getting beyond our bounds. This may seem natural enough, as no clearly-defined anatomical boundaries are drawn defining the areas given over to physician or dentist. The following quotation is the best answer to the accusation: "The Dental School is authorized by the Government to educate individuals to practise dentistry. Those selected to fill the chairs are legally qualified to formulate a curriculum. The curricula of *all* Dental Schools include Oral Surgery as one of their departments." Under the law, we have a Board of Examiners. This board, recognizing the mandate of the law, passes on the qualifications of applicants and grants licenses to practise dentistry, which includes as an integral part, oral surgery. It is, therefore, but reasonable to suppose that a regularly-qualified dentist has the right to practise anything taught in a dental school, including oral surgery. The recognition of the above by our medical friends would sometimes ease a strain occurring over a detail of minor importance.

It is in the field of focal infection that the best thought and greatest skill of our professions acting in unison can accomplish the greatest good. Here, either diagnosis or treatment leads through the fields of one into the other, and the border line of demarcation is hard to determine. The theory of focal infection is not new. As early as 1801 Dr. Benjamin Rush remarks: "I have been made happy by discovering that I have only added to the observation of other physicians in pointing out a relation between the extraction of decayed

and diseased teeth and the cure of general diseases." These facts were apparently forgotten for a century, until Dr. Hunter hurled his scathing criticism at those "gilded American traps of sepsis" as a causative factor of systemic disease. True to man's immemorial custom, within the ranks of both medicine and dentistry there developed a number of faddists, and their efforts seemed in a fair way to make our present century go down in history as a "toothless age." On the other hand, the "too-conservatives" paid no attention to these avenues of sepsis. The bulk of both professions, however, kept their heads, and now can work mutually and intelligently to the common end—the discovery and eradication of dental foci causing grievous harm to the individual.

In passing, I would like to particularly call your attention to the two most common foci the physician and dentist have to deal with in the mouth—the dental alveolar abscess and the so-called pyorrhea pocket. These have marked peculiarities of their own.

The cause of this so-called pyorrhea is not known. It may be a disease or it may be a form of destruction due to the lack of the proper use of a part. . . .

The alveolar abscess, on the other hand, must arise from some disturbance within the tooth pulp, commonly called the nerve. This must be dead and infected. The result is a clearly-defined circumscribed area immediately on the root end, within the bone. These two areas differ in origin, position, shape, direction, manner of growth and danger to the patient. Now, why mention these in detail? It is to draw your attention to one or two facts peculiar to these foci only. They are more chronic than in any other part of the body, because in all others we are dealing with soft tissues or bone, both with a definite blood supply and the necessary machinery for clearing up infection and rebuilding lost tissue. In the dental types I mention, the peculiar tissue of chief interest is the cementum, or outside covering, of the tooth root. It is different from any other concerned in a local focus; it has no circulation of blood; no power of repair, no power to throw off a dead portion of itself; hence, when dead and retained, it becomes a permanent irritant. These are points necessary to a proper understanding of mouth foci, and I would like to mention some common errors through not understanding them. In the literature of Hunter and Mayo constant reference is made to the crowned tooth as the dangerous tooth. It has caused suspicion to rest on every crown, regardless of what may be under it, for, after all, the crown is not what concerns us, but the condition of the root on which the crown rests. Many crowns are doing excellent service on sound, vital, non-infected teeth, while many little fillings are ignored, though they may cover a mass of sepsis in a dead root. It is certainly not the crowned tooth, but the pulpless tooth, that

must be regarded with suspicion. It is entirely the field of the dentist to diagnose these conditions and the evils that may result from them.

When one touches on the field of dental X-Ray, it would seem that here there is a sad lack of the proper professional spirit that has as its end result the wish for the ultimate benefit to the patient. In our practices we have patients arriving with full sets of pictures of their teeth and a typewritten diagnosis from a physician technician. In many cases, for good measure apparently, definite instructions are added to have certain teeth extracted or the pyorrhea treated. In other words, our patient is already prejudiced and his case has been diagnosed by one with no professional training in regard to the condition or tissue involved. As well, from the patient's standpoint, he has been bled for the price of a full set of pictures, when more often one would have been sufficient, and all because the profession with a full five years' course of training in this specialty alone has been completely ignored. "It makes some little difference to the fly which side of the tanglefoot he lights on." It seems unnecessary to state that the solution is simple. In private practice, simply imitate the system followed in all large institutions where exact diagnosis is imperative. There, no pictures of the teeth are even suggested. The patient is handed to the dentist for a mouth chart, and his decision is taken as final along his own line.

When you condemn the loss of a single tooth you not only take away $1/32$ of a masticatory machine, but you pave the way to the complete destruction of masticatory efficiency. When you order the complete removal of a set, you cut down that individual's power to properly triturate food by 90 per cent. There is a vast difference between using natural organs of mastication and a mechanical contrivance placed on the gums and manipulated by a balancing motion. You would do well to consider carefully before condemning an individual to become a cripple for life.

It would seem that a serious blunder, somewhere, somehow, has been committed in the past. Dentistry and medicine developing along separate lines, with the dividing line so poorly marked, is illogical. I believe, in the near future, absolute necessity will compel the one wishing to practise dentistry to seek a medical degree. Just here let me quote a few figures to show the modern tendency. Since 1921 the number of independent dental schools in the United States has dropped to seven. Of these left, 33 are now connected with universities containing medical schools. In Canada, all five dental schools are parts of universities giving the medical degree. We are slowly drawing closer in the endeavor to render better health service. Until the time comes when the medical degree is a necessity, we will have to make the best of conditions as they are, get over individualism

and personal assertion, and work together. The physician needs the dentist; the dentist needs the physician. Lack of this united effort has given rise to the reflection on both professions we hear only too often: "They took out all my teeth, but I don't feel one bit better."

"Men have found that mastery comes through limitation of field and concentration of effort; co-incident with this increasing division of labor provision must be made for the synthesis of results of special workers into harmonious wholes." To aid those who classify these total results must be "those practitioners of the eye, those of the head, some for the teeth, others for the belly and occult maladies."

References:

DR. WILLIAMS—*Dental Digest*.

DR. GIES—*Journal of American Dental Association*.

DR. A. D. BLACK—*Dental Summary*.

DR. GILMER—*Journal of American Dental Association*.

Ethical Code of the Syndicate of French Dentists

CODE OF DEONTOLOGY FOR THE USE OF PRACTITIONERS,
APPROVED BY THE GENERAL ASSEMBLIES OF JANUARY
21ST AND JUNE 9TH, 1923.

THE Council may penalize deviation from this code by a public rebuke in the case of minor faults, or in the more serious cases by alienation from the society. Some of the clauses of the code are as follows:—

The dentist should maintain the honor of his profession by the quality of his work and respectability of character; his word should be a sufficient guarantee to his patients for the correctness of treatment given. If he treats his clientele with honesty and his colleagues with tact he will earn the respect of both.

The practitioner should, in view of the character of his profession, endeavor to avoid commercialism; he should, moreover, treat with equal care and patience the rich and such poor as are received free. He should not be exorbitant in the matter of fees, and should not sue for fees in arrears except in cases of real rascality. Even then he should always be amenable to friendly settlement. In view of the privileges conferred by the State on the medical and dental professions, he should refrain from using methods whose sole object is lucrative.

Further, it is the duty of the dentist to educate the public in the use of hygiene and to put them on their guard against charlatanism.

He should make a point of attending conferences, and should acquaint his colleagues with any information he may gain by research, that all may benefit. He should not boast of his skill and knowledge before the lay public. Any young practitioner desiring to become known may publish his card, showing his name, profession, hours, and exact qualifications, in the local papers, but is not permitted to use such degrading means of advertising as posters, portrait bills, or insertions in the newspapers professing secret remedies, marvellous cures, etc.

It is the duty of the practitioner to maintain strict professional secrecy. He must never divulge any observations he may have made, or any conclusions drawn, to a third party. And if the patient of a colleague comes to visit him he must avoid saying anything to the detriment of that colleague.

Should a patient be suffering from any pathological complaint outside the dental province it is preferable to send him to his usual medical adviser. And when the patient of a colleague is treated in a consultation case it is impossible to change the treatment or to proceed in the future by a different method to that advised by the patient's regular dentist.

There must be no clandestine division of fees, that is no dichotomy, nor must any kind of certificate that is not strictly true be given.

The dentist is to remember the services rendered him by the labors of professional brethren in the past, and to support all measures to elevate the profession in the future. It is illegal to have another surgery where, under cover of the dentist's name, an unqualified person may operate. Those, again, who assist or act as substitutes in a dentist's premises should remember that in their keeping is the honor and interest of the institution and of the practitioner. And any such who use their position to exploit another's practice, temporarily under their control, for their own future profit, are guilty of dishonesty, and are liable to legal prosecution.

Those dentists who accept this code of Deontology must conform strictly to it on all occasions.—*L'Odontologie, Dental Record.*

Juvenile Jingles

A Mother's Joy

Eyes bright, teeth white,
Hair brushed just right,
Hands clean, neck too,
Nails shine like new,
Breath sweet and pure,
Ears washed; I'm sure,
A Mother's joy
This kind of boy.

—Dora L. Cameron.

An Invitation to the Canadian Dental Association Meeting in Vancouver, Aug. 4-9, 1924

THERE is, perhaps, no person in the eastern and middle western sections of our country, who has not at one time or another, planned a trip to the Pacific Northwest.

There have been associated with this trip, too, many of the thrills that have gone to make, not only in imagination, but in actuality, a fairyland of this favored section.

Nowhere is there to be seen more that is strange and new, and yet savors of the eons of time in the hands of Mother Nature, than a trip to the coast.

What with the possibilities of the Great Lakes; the prairies, with what will at that time be a crop ready for the gathering; the stupendous grandeur of the Rockies, and the placid waters and equable temperatures of the Pacific, there is food for the imaginations of us all.

When it is recalled that the City of Vancouver is but 37 years old, that it is rapidly becoming one of the world's greatest ports, and that it will soon be a force to be reckoned with in the economic annals of Canada, it is not overstating matters to say that this city deserves closer first-hand acquaintance.

Vancouver invites you, wants you, and will be delighted to have you with us during the week of August 4 to 9. Will you meet us half-way?

WHAT THE VANCOUVER MEETING HOLDS IN STORE.

Situated as is Vancouver, on the extreme west coast of this widely diversified Dominion, it is her first opportunity to entertain the Canadian Dental Association.

Since its inception, the preponderating numbers in the east have made meetings in that section imperative.

It has, however, fallen to the lot of the western coast to act as the host in this year's meeting. The coast accepts the courtesy and will be glad to respond.

There is, perhaps, no one thing more vital in the economic and professional life of Canada than that there be a unity of feeling and of understanding between its more widely separated peoples. No country, and in this respect no profession, can long endure and continue to deliver the obligation which has been imposed upon it, unless there exist between the factions something which tells them of each other; something that places the welfare of the whole in a position of paramount importance as compared with the welfare of the local section.

To promote this feeling of goodwill the British Columbia men are working hard to show, not only in terms of technical knowledge, but in the acts of hospitality they can conceive, that they are glad to have with them this year the representative men in dentistry, of the Dominion of Canada, and of the Canadian Dental Association.

PROGRAMME FORECAST.

In the swirl of activity which must needs always attend the meeting of a body such as the Canadian Dental Association, the arrangement of the programme is not only one of detail but of changing conditions.

Since the final announcement of the programme features can of necessity not be made now, this information is being sent to you with a view toward the earliest possible tentative ideas that can now be made public.

A detailed programme will be coming into your hands about the end of June. It is hoped that this later issue may carry the latest available information with reference to the programme, but a few advance ideas on this point may well be given here.

The east is contributing liberally to the programme. Not at all behind is the prairie section, which is sending a number of clinicians to the meeting.

The western men have taken the opportunity of bringing here men with whom they have been closely associated in the course of dental study and practice during the past years, men from the Pacific States who have always carried their banners high and been most enthusiastic in their support of better dentistry for the public.

On another page will be found a list of these men, a list arranged in sections, so far as the present available information will allow.

TRANSPORTATION.

Since it is best arranged through the head offices of the various transportation companies, the eastern members of this Association have arranged for through fares and rates for their intending members.

As you will note, the outgoing trip is planned by way of the Canadian National Railways, with the option of coming through to Vancouver over the old Canadian Northern line from Edmonton, or of coming over the original Grand Trunk Pacific lines to Prince Rupert, and thence by boat.

The return trip is being arranged over the Canadian Pacific Railway, both journeys being planned with a view toward giving to the passengers the maximum amount of time at points that would naturally be of the greatest interest.

In addition to this there has been arranged a special side trip from

Vancouver to Victoria, Seattle, and Portland, those four outstanding cities of the Pacific Northwest, which are in the minds of nearly every eastern and prairie resident to-day.

Your committee has done its work well in this regard and will be glad to co-operate with anyone desiring further information than that already shown in following pages.

QUARTERS AND EXHIBITS.

For the purposes of the meeting the King Edward High School, corner of Twelfth Avenue and Oak Street, has been secured. This building offers ample accommodation for our needs. In addition to a large auditorium and numerous class-rooms, there is good space for exhibits in both rooms and hallways. A large number of manufacturers and dealers have already signified their intention of being present, and there will be many more before the meeting opens.

A feature of the quarters secured is that they contain a well-equipped cafeteria at which lunch will be served throughout the meeting, making it unnecessary to go to the downtown sections for lunch. This affords greater time for lunch and for the view of exhibits without rushing the attending men.

Plans are in the course of preparation for daily entertainment of the members during luncheon. Announcement of these will follow in a later issue.

ENTERTAINMENT.

While the Pacific Province of Canada has not before had an opportunity of acting as the hosts to a strictly Canadian body of dentists, it is arranging its part. A committee of its men is planning the social activities, which, it is hoped, will form an agreeable part of the week's plans.

In addition to this, there is now working a strong body of the dental ladies' auxiliary, which will operate in accordance with their own plans. No visiting lady need feel that her convenience and pleasure will be neglected during her stay, and none of our professional colleagues need feel that they are imposing any hardship upon their wives in bringing them here for the week, busy though they themselves may be.

To those from the prairie provinces this will be particularly agreeable, since they can rest assured that their wives, friends and relatives will be properly looked after during their attendance at clinics and lectures.

HOTEL ACCOMMODATIONS AND RESERVATIONS.

Since Vancouver will be at the height of its tourist season during the week of the Canadian Dental Association meeting here in August,

and since the Vancouver Exhibition opens on the week immediately following, it is advisable that those who wish to be assured of hotel accommodation make advance arrangements.

In the programme issue, which will be in your hands about the end of June, there will be listed various hotels with approximate rates for accommodation. This work is being cared for by a special committee, which will be glad to do everything it can to assist.

Should you be anxious to secure accommodation before this issue is out, kindly communicate with Dr. P. H. Van Dervoort, 402 Birks Building, who is in charge of this work.

OPERATIVE SECTION.

This section presents much that will be of special interest. Dr. F. A. Williams, of Los Angeles, who is probably better known to the men on the Pacific Coast than to easterners, has long been recognized as one of the leading geniuses of dentistry. His work along the lines of higher dentistry has brought favorable comment wherever it has been exhibited. It is fitting, then, that he be the man who discusses the treatment of mouths whose reconstruction as a whole is necessary.

In the handling of a practical case of Porcelain Jacket crown technique, those in attendance will be permitted to see in action one of the best men in this line that the Pacific Coast has produced. Dr. Argue finds his greatest pleasure in the practical demonstration of his work, and is certain to leave a lasting beneficial impression.

The local Study Clubs of the Vancouver Dental Society have put in a great deal of labor and time in making this section of great interest. The Club, under Dr. T. W. Snipes' direction, will put on most interesting clinics on Porcelain and Gold Inlays; Fixed Bridges; Technique, etc., while that under Dr. O. J. Courtice will do equally well their work on amalgam.

The list in this section, to date, follows:

DR. T. W. SNIPES—*Chairman.*

DR. F. A. WILLIAMS, Los Angeles, Cal.—*"Treatment of Cases Involving Reconstruction of Entire Mouth."*

DR. J. E. ARGUE, Seattle, Wash.—*"Porcelain Jacket Crown." Practical Case.*

DR. E. KENNEDY, Banff, Alta.—*"Fixed Bridges, Reducing Torsonal Stress on Abutments with Anchorages in Vital Teeth, and a Simple Method of Constructing Porcelain Dummies."*

DR. L. F. KRUGER, Toronto, Ont.—*"Amalgam Restoration."*

DR. T. W. SNIPES, Study Club, Vancouver.—*"Porcelain and Gold Inlays. Fixed Bridges, Techique, etc."*

Dr. T. W. Peden Dr. Guy, Dr. Bricker, Dr. Vandervoort, Dr. Sproule, Dr. Spencer, Dr. Loudon, Dr. Plant, Dr. Hall, Dr. McBeth.

DR. COURTICE, Study Club, Vancouver.—*"Amalgam."*

Dr. Courtice, Dr. Brighthouse, Dr. E. L. Thompson, Dr. R. L. Davidson, Penticton, B.C.

DR. A. J. GARESCHE, Victoria, B.C.—*"Gold Foil," Practical.*

DR. J. N. STEWART, Hamilton, Ont.—*"Porcelain Jacket Crown."*

PROSTHETIC SECTION.

With the increasing importance being accorded prosthetic work by the dental profession, it was felt that this section of our programme should be made as extensive and diverse as possible.

Under the chairmanship of Dr. Frank P. Smith, of New Westminster, a number of able clinicians have been secured to cover as far as possible the various phases of this work.

Of the Pacific Coast men at this meeting, two of the outstanding teachers and demonstrators will be Drs. C. J. Stansbery, of Seattle, and Aubrey Martin, of the same city. Dr. Stansbery is too well known locally to require much further mention, except that his clinic on "Impression Taking," will by no means cover all that he has to give you, including his exhibit before the American Dental Association. Dr. Aubrey Martin, in discussing and demonstrating "Surgical Preparation of the Mouth for the Reception of Artificial Dentures," will be taking up one of our heavy problems of to-day in the relation of the prosthodontist to the exodontist.

Two local study clubs have been working hard in this section. One, under Dr. Smith's own supervision, has planned to give work on cast gold dentures; full upper and lower vulcanite dentures (cases completed during the meeting); and other exhibits.

Dr. Emery C. Jones has been in charge of a similar club on Partial Dentures, which will also be instructive and interesting to those seeking further along this line.

DR. F. P. SMITH—*Chairman.*

DR. C. J. STANSBERY, Seattle, Wash.—"*Impression Taking, etc.*"

DR. AUBREY MARTIN, Seattle, Wash.—"*Surgical Preparation of the Mouth for the Reception of Artificial Dentures.*"

DR. E. E. BRUCE, Kincardine, Ont.—"*Quick and Accurate Method of Relining Vulcanite Dentures.*"

DR. FRANK SMITH, Study Club, Vancouver.—"*Cast Gold Dentures.*" "*Full Upper and Lower Vulcanite Dentures.*" (*This will be a completed case during the meeting.*)

Dr. Hacking, New Westminster, B.C.; Dr. Pollard, Vancouver, B.C.; Dr. Loveridge, Vancouver, B.C.; Dr. Gatewood, Vancouver, B.C.; Dr. Ray Wilson, Vancouver, B.C.

DR. E. C. JONES, New Westminster, B.C.—"*Partial Dentures.*"

W. S. Watson, T. R. Peden, G. L. Plant, Gordon Macbeth, E. F. Allen.

EXODONTIA AND X-RAY SECTION.

This section carries with it practically every phase of the surgical and diagnostic part of dentistry.

Dr. J. Milton Jones, who has this section in hand, has been successful in bringing together a large number of outstanding men from Canada and the Pacific States.

The eastern men are perhaps better known to the majority of you

than they are to us, but there are one or two of the western men who may require some introduction.

Dr. O. T. Dean, of Seattle, has long been an important figure in the dental surgical history of the west. Men meeting him for the first time will find his work and his personality something that can be carried away with them and referred to in memory with pleasant enthusiasm.

Dr. Frank Hergert, also of Seattle, has been a long pioneer in the field of Radiodontia, and will be an interesting clinician.

All told, as the list will indicate, there has been nothing left out to make this department complete, and those seeking advancement in the surgical field will be well rewarded.

DR. J. MILTON JONES—*Chairman.*

DR. O. T. DEAN, Seattle, Wash.—*"Interseptal Alveolotomy."*

DR. CHALMERS, Toronto, Ont.—*"Surgical Removal of Teeth."*

DR. ROY BIER, Winnipeg, Man.—*"Nitrous Oxide Anaesthesia."*

DR. H. G. ROBB, Toronto, Ont.—*"Table Clinic." (Removal of Impacted Third Molar.)*

DR. W. W. IRWIN, Moose Jaw, Sask.—*"Dormoform for Extraction."*

DR. B. O. FIFE, Toronto, Ont.—*"Root Resection."*

DR. AMY, Toronto, Ont.—*"Selected."*

DR. FRANK HERGERT, Seattle, Wash.—*"Radiodontia."*

DR. J. G. O'NEILL, Port Arthur, Ont.—*"Nerve Blocking."*

PERICLASIA SECTION.

Most of the work in this section will be of a practical nature. Dr. W. J. Bruce, chairman for this section, has been fortunate in securing liberal support in this field.

Being a specialty, which is rising in prominence in the dental world, the men shown in the following list will amply repay close attention. Dr. M. F. Garvin, of Winnipeg, is a figure with whom you are nearly all familiar, and will be presenting interesting work on "Gum Surgery."

Drs. Mason, of Edmonton; Snell, of Toronto; and Coldwell, of Vancouver, will complete the list in this section.

DR. W. J. BRUCE—*Chairman.*

DR. M. F. GARVIN, Winnipeg, Man.—*"Gum Surgery."*

DR. MASON, Edmonton, Alta.—*Practical.*

DR. COLDWELL, Vancouver, B.C.—*Practical.*

DR. SNELL, Toronto, Ont.—*Practical Case.*

ORTHODONTIA SECTION.

This portion of the programme deals with a branch of the work with which dentists, as a class, are not sufficiently familiar. It would be over-stating matters to presume that every dentist should also be an Orthodontist, but it certainly is true that he should be sufficiently familiar with the work that these men are doing that he can intelligently co-operate with them in caring for the public health.

Dr. W. J. Lea, chairman of this group, has aligned with him a strong array of talent, which will serve to brush up in the minds of many the things that have either been forgotten or never been learned.

DR. W. J. LEA—*Chairman.*

DR. G. W. GRIEVE, Toronto, Ont.—“*Paper Observations of the General Practitioner.*”

DR. S. W. BRADLEY, Ottawa, Ont.—“*Some Types of Malocclusion and Their Correction.*”

DR. MANLEY BOWLES, Winnipeg, Man.

DR. JUVET, Ottawa, Ont.

DR. A. F. DYER, Vancouver, B.C.—“*Jackson's Removable Appliance.*”

PAPERS.

DR. A. W. THORNTON, Montreal, Que.—“*Some Necessary Expansions in the Teaching of Dentistry.*”

DR. WALLACE SECOMBE, Toronto, Ont.—*Paper, Selected.*

DR. A. D. A. MASON, Toronto, Ont.—“*Applied Dental Anatomy.*”

DR. HARRY GILCHRIST, Edmonton, Alta.—*Dr. Gilchrist will discuss Dr. Aubrey Martin's Paper on “Surgical Preparation of the Mouth for Artificial Dentures.”*

CUSTOMS ARRANGEMENTS.

It has been arranged that the King Edward High School, which will house the Canadian Dental Association during its sessions in Vancouver, be considered a bonded warehouse during the meeting. This will enable exhibitors from the United States to bring their goods direct to the School in bond, and pay duty only on such articles as are sold here.

Should the number of American exhibitors be large, it is probable that a customs broker will be engaged by the Association to care for all matters in this connection. Further announcement of plans in this direction will be made in our programme issue.

COMMITTEES.

For the information of those who may wish to communicate with the men in charge of the Vancouver arrangements for this meeting, a list of the Committee Chairmen is supplied below:

Chairman of the Executive—Dr. W. J. Bruce, 404 Birks Building.

Programme—Dr. T. W. Snipes, 413 Birks Building.

Entertainment—Dr. W. J. Lea, 501 Birks Building.

Dr. W. S. Watson, 305 Birks Building.

Quarters and Exhibits—Dr. J. S. Bricker, 202 Vancouver Block.

Hotels and Refreshments—Dr. P. H. Van Dervoort, 402 Birks Bldg.

Publicity and Information—Dr. A. T. Oberg, 203 Coughlan Bldg.

SPECIAL TRAIN.

For the accommodation of those attending the Twelfth Meeting of the Canadian Dental Association the Transportation Committee

have completed arrangements for the special train which will carry the excursion westward. This will be the finest and most enjoyable manner in which to see your own country.

The special stop-over privileges and sleeping on your Pullman instead of hunting an hotel will be an added inducement.

The official route will travel via Great Lakes; C. N. R. to Prince Rupert; ocean steamer to Vancouver through the finest scenic waterway in the world. Returning, the route will follow the C. P. R. through the mountains, where enjoyable days will be spent. The season of the year will be conducive to pleasure and give one a good idea of the harvesting industry in our great West.

Several side trips may be taken from Vancouver by rail, boat or motor; a trip may be taken to Skagway, lasting nine days, through the fjords of the British Columbia and Alaskan coast, viewing mountains, forested islands, ice-clad peaks, glaciers, and the purple twilights of Alaska.

Round trip from Vancouver will be \$80.00 up. The side trip to Victoria-Seattle-Portland may be studied from the printed itinerary.

Motor trips abound in great numbers, and variety will be found among the many parks and scenic groves.

The return fare and lower berth for the trip will be \$202.95 (meals and berths on all steamers included). The itinerary should be studied carefully.

Keep on Doing !

“**T**HERE is a lot of joy in living if you strike the proper gait:
If you always come up smiling in the face of every fate,
If you're keeping step and whistling some lively little tune,
You'll be living gay and happy as a sunny day in June. Keep a level head, don't worry, help your brothers on the way; Let the sunshine of good humor shine upon you ev'ry day; Speak a cheerful word at all times, never 'knock' your fellow man. And you'll surely be rewarded, just keep doing all you can. There is lots of joy in living if you live your life aright; Lots of sunshine and of roses, keep your eyes turned to the light. Look behind the clouds of trouble, there's a silver lining there, And you'll find it if you're only living life upon the square. Scatter good cheer like the thistle scatters seed before the wind, And the petty woes and troubles soon will be left far behind. Be a 'Booster' every minute, help along your fellow man, And you'll surely be rewarded—just keep doing all you can.”
—Anon.

Local Anaesthesia in Conservative Dentistry

BY J. B. PARFITT, M.R.C.S., L.R.C.P., L.D.S. ENG.

Dental Surgeon, Guy's Hospital.

I HAVE chosen the subject of "Local Anæsthesia in Conservative Dentistry" partly because I am much interested in it myself and partly because I feel that, in spite of the advocacy which it has received, it is not yet practised as much as it deserves to be. I propose, therefore, to present to you an account of the last eighty-four consecutive cases that have occurred in my own practice. These represent an average of about one case in four, and as I have included in the total number of fillings many trivial operations, the 24 per cent. of cases comprise practically all the distressing cavity preparations and nearly all the pulp extirpations.

I can add my quota to the great amount of testimony already on record as to the ease, safety and usefulness of local anæsthesia in all manipulations of teeth with living pulps. There is no need for me to enlarge on the saving of "nerve strain," both to patient and operator. Patients who have once had an anæsthetic for a cavity preparation are spoilt for bearing much pain afterwards, and, from the operator's point of view, I can say for myself that the elimination of all, or nearly all, the painful teeth from one's daily routine has resulted in such a relief from strain that it has made a real difference to life.

One most important advantage is the increased efficiency rendered possible by absence of pain to the patient. Not only can cavities be prepared with greater ease, but better care can be taken of the pulp. In quite a number of cases I am quite sure that the anæsthetic has made all the difference between saving the pulp and being obliged to devitalize it; not altogether, nor always, because the patient could not stand pain, but because the careful manipulation necessary could not have been accomplished without proper quiescence and co-operation of the patient rendered possible by the absence of pain. An incidental advantage by no means to be despised is the accompanying anæsthesia of the gum, which enables the operator to apply a matrix or trim the cervical edge of cavity or filling in those cases where caries has gone below the gum line.

I will not deny that working under local anæsthesia has minor anxieties of its own. The absence of pain is a temptation to the operator to be careless, not so much perhaps of the tooth cavity or pulp as of the gum, and he must never let himself forget that although the tissues are insensitive to pain, they are as vulnerable to injury as ever they were. Operating under anæsthesia certainly calls for more

vigilant care of the pulp; once the solution is injected all information to be gained by the reaction of the pulp is gone. It is necessary, therefore, to make sure of the condition of the pulp before giving the anæsthetic. As a rule, cavities are commenced without injection, the patient is told he can have an anæsthetic if necessary. If he is not sufficiently distressed to take advantage of the invitation, the preparation can be proceeded with; if, on the other hand, he says that it causes pain, the vital reaction of the pulp is thereby proved. In one case the pulp was exposed unintentionally; it was removed and a root dressing inserted.

Local anæsthesia tends to the lengthening of visits rather than shortening them. The time taken by the injection is more than saved in the cavity preparation, but when two or three cavities are insensitive at the same time it generally seems a pity not to get them finished and filled straight away. In this connection, I may say that in all, or nearly all, of the cases of the series I am presenting to you the fillings were inserted at once, and there was not the slightest cause in any single case to regret the proceeding. In my own case the injection of novocain has practically displaced all other means of alleviating pain; moreover, since the series started, I have not used arsenic once for devitalization of a pulp, although "pressure anæsthesia" has been employed in a few suitable cases.

I will now say a few words about methods and appliances; of the methods published and in use, many are equally efficient, but not all are equally serviceable. Every operator knows that in all kinds of technique a detail of small scientific and theoretical importance may make a great deal of difference in practical usefulness. In local anæsthesia for dental purposes, speed of preparation and filling of the syringe is just such a detail, although it is, of course, secondary in importance to the main requirements of quality, sterility and density of the solution and efficiency and cleanliness of the syringe itself.

The Syringe.—The Fischer syringe has been used in all these cases excepting only the mandibular injections. I do not say that other syringes are not as good, but this type has several excellent characters. The joints are tight, and if they become loose and leak, the glass barrel shows what is happening, and so prevents the operator thinking the solution is entering the tissues when, as a matter of fact, it is going elsewhere.

The Fischer syringe is readily sterilized by boiling, and after sterilization can be kept permanently in a bath of 1 in 20 carbolic, where it lies ready for use. If an iridio-platinum needle is used, it can be kept mounted on the syringe in its antiseptic bath. Steel needles rust quickly in carbolic, and a simple way to keep them ready for use is to thread each one into a sterilized nozzle, and keep a supply of needles so mounted in a closed container, the air in which

is saturated with formaldehyde gas, given off from a plentiful supply of paraform. It is then only a matter of seconds to pick a syringe out of its bath of carbolic and screw on a nozzle with its contained needle.

For mandibular anæsthesia I have used a stout 5 c.c. glass syringe armed with an iridio-platinum needle 0.8 mm. thick and 40 mm. long; both syringe and needle are kept immersed in carbolic solution.

The Solution.—The most expeditious plan is, of course, to use a ready-made solution, but, personally, I have given up employing anything but solutions freshly-prepared from tablets, excepting occasionally for very trivial operations, in which only a minim or two might be required; several of the small inconveniences I have experienced, or that have come under my notice, have been in cases when ready-made solution has been employed. All but one of the injections of the series have been made with tablets dissolved in Ringer's solution; in three others a small quantity of ready-made solution was injected as well. I have nothing to say against normal saline for dissolving the tablets, but can state that novocain dissolved in Ringer's solution seems to be absolutely non-irritant, as no pain is felt during the injection, nor is pain or other trouble experienced afterwards. The great difficulty with stock solution of any kind, whether it be Ringer, normal saline, or plain distilled water, is to ensure its sterility. Boiling at the time is all very well, but I like to feel that it is sterile to start with. All ordinary bottles are liable to be fouled every time the cork or stopper is removed, to say nothing of pouring the solution over the contaminated mouth of the bottle. A great deal of contamination is prevented by the use of a glass-capped bottle, instead of a stoppered one; but, even then, there are chances of fouling the stock solution with dust every time the bottle is opened. An obvious way of overcoming the difficulty is to add an antiseptic to the solution. Unfortunately, all ordinary antiseptics are most undesirable constituents of solutions for injection, being either irritant or poisonous, or both. In thymol, however, we have an antiseptic that is efficient for our purpose, and, although irritating, is readily removed from the liquid by the simple plan of boiling it before the addition of the anæsthetic tablets.

If a lump of thymol is kept in the capped stock bottle of Ringer's solution it will ensure its continual freedom from organisms.

In order to prepare the solution for use, a small excess is poured into the porcelain capsule (itself just removed from the formalin cabinet in which it was placed after sterilization). The solution is now boiled until the issuing steam no longer smells of thymol, which happens in about thirty seconds or so. A few drops of the now

thymol-free Ringer are drawn up into the syringe, which has already been armed with its needle.

This quantity is rejected, and serves the double purpose of washing the last traces of phenol from the syringe and proving that both syringe and needle are in perfect order.

The Tablets.—The remainder of the solution is now ready for the reception of the tablets.

It is a matter of faith—not, I hope, unfounded—that the tablets are sent out by the manufacturer in a sterile condition. We must be quite sure that no infection is imparted to them in their passage from the tube to the capsule in which the solution is made. This is ensured by the simple plan of removing the cork of the tablet tube, flaming the mouth, dropping the required number of tablets straight into the solution, flaming the cork, and replacing it in the tube.

With regard to the drug content of the solution, novocain has been used in every case. The adrenalin content is less than is usually employed, and almost always a certain amount of strychnine is added to the solution.

Dr. Pare's recent letter in the *BRITISH DENTAL JOURNAL* emphasizes the dangerous nature of adrenalin, and the proportion he advises, namely, 0.00005 gm. to 0.07 of novocain, is that used in the greater number of cases in the series.

These quantities represent one E tablet and one F; to these are added one tablet of strychnine containing 0.0022 gm., or one-thirtieth of a grain. These three tablets are dissolved in 3, 4, or 5 c.c. of Ringer. The solution is boiled just sufficiently to dissolve the tablets and then drawn straight into the syringe. Any quantity up to the whole may be used for one case, according to the circumstances. For an aged person or one suffering from high blood-pressure or just recovering from a debilitating illness, I should modify the solution, if, indeed, I administered a local anæsthetic at all (which I should usually do only after getting a report from the patient's medical attendant).

If it were decided to give such a person a local anæsthetic the solution would be further weakened, and the adrenalin lessened still more or left out altogether. With regard to the strychnine, if the patient had high blood-pressure, I should leave it out; but if he were merely feeble, a small quantity would be an advantage. Fortunately, from the nature of things, the great majority of patients who need an anæsthetic for conservative work are healthy young adults or adolescents, and in that class of patient my experience has almost invariably been that the solution I have described produces no unpleasant effects of any kind, either at the time or afterwards.

In the record of a case, I state the total quantity of drugs injected rather than the amount of solution employed. In this series less

than 0.05 grm. of novocain was used in twenty-six cases, between 0.05 and 0.01 grm. in fifty-four, and above 0.1 grm. in three.

Preparation of the Site of Injection.—The site of injection has been prepared in the ordinary manner by drying and painting with iodine. The necessary absence of septic apical foci in connection with teeth with living pulps probably explains the absence of inflammatory infective after-effect in these cases.

I will now pass on to an analysis of the series; they amount to eighty-four, or 24 per cent. of all teeth treated in the period covered by the series, except such as were known to be pulpless. They include thirty-nine upper teeth by infiltration, four injections at the maxillary tuberosity, twenty-five lowers by infiltration, eleven injections at the mental foramen, and five mandibular injections. In none of the cases was the infra-orbital or the second division injection used, nor was Mr. Parrott's intraosseous method resorted to. This is not because I do not believe in Mr. Parrott's method: I always keep a conical gold needle in the carbolic bath, ready for the purpose, but do not resort to it if the ordinary injection produces satisfactory anæsthesia.

Upper by Infiltration.—The method usually employed was to enter the sharp steel needle into the loose reflection of mucous membrane more than half way up towards the tooth apex. The needle was held at an angle of about 45° to the bone and in the same plane as the long axis of the tooth, excepting in the case of the second bicuspid and first molar, in which teeth the angle of the lip compelled the syringe handle to occupy a more mesial position.

Inasmuch as the bone itself is far from vertical, this often means holding the syringe nearly horizontally.

The needle is driven into the loose tissue and some solution injected. The ball of the finger is then pressed firmly over the position occupied by the needle point, dissipating the solution placed there. After waiting thirty seconds or so, the needle is driven on until its point comes to rest on, or in, the periosteum, near the level of the root apex. The remainder of the solution is then very slowly injected under the pressure of the ball of the finger.

Anæsthesia usually comes on at once. If it fails to do so in a minute or so some more solution is injected, the second puncture being, of course, absolutely painless. In five cases a third injection was made.

In one central incisor, two canines, one bicuspid and one molar there was either a partial or a transient anæsthesia, and in one molar no anæsthesia at all. In two of these failures the fault certainly lay in my technique; the patients were extremely nervous and excitable, and in the one with no anæsthesia I do not think I got the solution in place at all. Four of the partially anæsthetized teeth were so far

successful that the preparation was accomplished without difficulty and without distress to the patient.

First molars responded invariably and easily, excepting for the two cases just referred to. The most difficult of the upper teeth, in my experience, has been the canine, and I now make a point of increasing the dose of anæsthetic for this tooth, one recent patient having had about 0.09 gm. of novocain with 0.00004 gm. of adrenalin and 0.0033 gm. of strychnine injected in one puncture in the canine fossa.

Incisors and bicuspid call for no comment, excepting that I think it is sometimes a good plan to inject both sides of the middle line for the central incisor.

Injections at the Maxillary Tuberosity.—In my experience this injection is the easiest and most certain of all. The method employed was the ordinary one described in all the books, the few cases that occurred in the series were immediately and uniformly successful and without inconvenience of any kind at the time or afterwards.

Lower by Infiltration.—Injection into the mental fossa resembles the ordinary injection for upper teeth and calls for no comment. Only one case occurs in the series, on account of the infrequency of caries in the lower incisor teeth. Twenty molars and two bicuspid were injected by way of the interdental papilla, and the all but invariable success somewhat surprised me.

The method employed was to insert the needle from the outside inwards and downwards into the base of the interdental papilla and inject very slowly on account of the comparative impermeability of the tissues. The papilla posterior to the tooth was chosen for preference, but in many cases anæsthesia was produced through the anterior one. If the tissue allowed, the needle was thrust downwards to a depth of one-eighth in. to one-quarter in. The gum posterior to the third molar takes the solution more easily than the interdental papilla, and injection into this site usually produces anæsthesia of the tooth without difficulty.

One second molar had a small spot still sensitive under the anterior pit, the rest of the tooth being anæsthetized; one bicuspid was partially anæsthetized, and one second molar doubtfully so; but in all three cases the preparation was completed without the patient appearing to suffer much pain.

Mandibular Injection.—Owing to the possibility of producing anæsthesia in the lower molars by injection in their immediate neighborhood, there are only five cases of mandibular injection for fillings in my series. In the time covered by it there were, however, six mandibular injections for other purposes, and I will base my few remarks on the eleven cases rather than on the five.

The syringe used was the same in all, the 5 c.c. all-glass syringe armed with an iridio-platinum needle 0.5 mm. diameter in the earlier cases and 0.8 mm. in the later ones. The 0.8 m.m. needle was provided with a movable guage, which showed not only the depth penetrated, but indicated the direction of the aperture in the needle. The method adopted was the same in all cases, namely, to enter the needle into the mucous membrane 1 c.c. above the occlusal surfaces of the teeth and just inside the internal oblique line; this point is generally marked by a dimple in the mucous membrane. The syringe was held in such a direction that it crossed the arch over the opposite canine. The aperture of the needle was kept downwards and the needle thrust onwards until it was buried the required distance; the syringe was then rotated about its long axis so that the aperture looked inwards towards the nerve trunk; in other words, the point was on the side near the bone.

The syringe was always held well over to the side opposite to the injection, so as to keep the point near the bone. The large size of the needle and the fact that its point was directed upwards apparently enabled it to glide along the bone without scratching the periosteum, as it reached its destination quite easily in each of the cases without any change in the direction of the syringe for the purpose of steering it round the internal oblique line, and there was no after trouble of any kind in either of the cases. This latter fact I can vouch for, as I have made the injection on myself with the 0.8 m.m. needle, and beyond the anæsthesia, which lasted two or three hours, experienced nothing in any way out of the ordinary course of things. None of the cases call for comment in any way.

Mental Foramen Injection.—Ten cases were treated by injection at the mental foramen, and I have to confess that of all the injections I like this one least of all.

Four of the cases call for no comment; in two the sensation came back in about ten minutes and before the cavity preparation was finished. In one, anæsthesia was perfect, but the patient had a tingling of the legs and tremor of the hands; the sensation soon passed off, however, and two large cavities were prepared and filled. In one case the anæsthesia was apparently partial; the patient stood the preparation with equanimity, and it was not quite easy to tell how much pain he really did feel. In two cases there was no anæsthesia, one was for a pulp extirpation which was completed with pressure anæsthesia; the other not only had no anæsthesia, but felt faint as well. This patient and one other had some persistent numbness over the distribution of the mental nerve.

I believe that most of these difficulties were due to faulty technique; in the last two cases it is fairly evident that the nerve itself must have been punctured. In those, as in others, I believe that pain

during injection is always a sign of something wrong, and calls for some change, either in the solution or the technique of its injection.

Summary of Difficulties.—In the eighty-four cases, the total number showing any unpleasant symptoms amounted to five, and of these none was dangerous or, in fact, sufficient to make the patient willing to abandon the cavity preparation.

One felt faint, but not nearly approaching to any loss of consciousness; two had some palpitation of the heart for a very short while; one had some tingling of the legs and what he called "slight heart sensation," both of which disappeared in a couple of minutes or so after, or because of, the administration of one or two drops of validol. One patient started to retch slightly once or twice after an injection in the gum of the lower jaw; this also passed off directly.

In five cases, one upper first molar, one upper canine, one lower molar and two lower bicuspid, anæsthesia was either absent or so partial or evanescent as to be useless.

In eight cases the anæsthesia was incomplete, but sufficient to enable the operation to be performed without any apparent distress to the patient, who, in one or two instances, actually expressed appreciation of the result.

Careful inquiries were made as to after-pain; only four cases were reported, one after mental foramen injection, in which the anæsthesia only lasted ten minutes, and completion of the cavity preparation was postponed, one after injection for an upper canine and one with a lower molar. Whether the injection had anything to do with either, or all, of them it is not easy to say; a tooth may occasionally grumble for a time after filling when no injection has been used at all. Owing to the practice of filling teeth at the same visit with the giving of the injection, some patients would not be seen again for some time if the particular tooth treated happened to be the last operation required. These patients were always asked to report if they felt pain, but so far none have done so.

Two of the mental foramen cases reported numbness of the area supplied by the nerve, one was apparently very slight, the other more marked and lasted three weeks, and perhaps longer.

After two, or occasionally three, punctures and their accompanying swabbing with iodine, the mucous membrane sometimes gets sore for a day or two, but I would rather take the risk of this inconvenience than run unnecessary chances of infection of the puncture track and the solution.—*British Dental Journal*.

SEPARATING MEDIUM.—Use French chalk for a separating medium in investments, and avoid the unpleasant mess associated with oil or vaseline.—*B. W. Neave, B.D.S., in Dental Science Journal*.

Nitrous Oxide—Oxygen Anaesthesia

WHY NITROUS OXIDE-OXYGEN, IF SKILLFULLY ADMINISTERED,
SHOULD BE THE ANAESTHETIC OF CHOICE FOR THE
EXTRACTION OF TEETH.

FRANK S. JARMAN, D.D.S., TORONTO,

Royal College of Dental Surgeons.

MANY patients often dread the extraction of teeth more than they do a major operation. We should therefore use an anæsthetic that is not unpleasant to take and does not leave bad after effects. For these and the following reasons N_2O+O should be first choice.

It is the safest.

It is the least harmful.

It is the most quickly eliminated from the system.

The normal functions of the body are less interfered with.

Healing is not retarded.

In order to obtain the best results with this anæsthetic we must know three things:

The manipulation of the apparatus.

The technique of administration for the different types of patients.

The signs and significance of the signs of anæsthesia.

The manipulation of the apparatus can be learned in a few minutes. The technique of administration requires judgment, tact, observation and a delicacy in the operation of the machine. To know and observe the signs of anæsthesia requires experience, judgment, a keen sense of hearing and a watchful eye. We cannot use a cut and dried technique, but must put individuality into each administration.

We can make use of four important signs of anæsthesia: eye, respiration, color and muscle reflexes.

During the induction period the pupil of the eye, especially in nervous patients, is enlarged, due to the stimulation of the sympathetic nervous system. The eye lid and eye ball are sensitive to touch. In normal or surgical anæsthesia the pupil is slightly contracted, due to a *paralization* of the sympathetic nervous system, and the eye-lid and eye-ball are insensitive to touch. In deep or profound anæsthesia the pupil is again enlarged, due to a paralization of the *central* nervous system, but the eye-lid and eye-ball are insensitive to touch.

The respiration might be of any type during the induction period, but quickens and becomes more uniform and "machine-like" as anæsthesia approaches. If the anæsthesia is carried too far the breathing becomes irregular, sobby, gaspy, and finally cessation takes place.

The color is a good guide in most cases, but cannot always be depended upon as anæmic patients may pass through the different stages of anæsthesia without changing color, while full-blooded patients may show a marked synosis before anæsthesia is reached. Usually the color changes from normal to a rose color under the anæsthesia, but if the anæsthetic is pressed too far the rose color changes to blue.

During the induction period the muscles might move voluntarily. In normal anæsthesia they are usually quiet and may or may not be relaxed. In profound anæsthesia they become jerky, rigid and convulsive. It is for this reason that nitrous oxide-oxygen is considered so safe, the danger signs are so outstanding, namely:

Enlarged, fixed pupil.

Sobby breathing.

Synosis.

Jerky, twitching and rigid muscles.

If these danger signs appear we have at our command oxygen under pressure that can be forced into the system. A patient can be forced from deep anæsthesia into light anæsthesia in a matter of seconds, and vice versa, therefore, the machine must be regulated with skill and judgment. The successful anæsthetist is the one who can anticipate what is going to happen and is prepared for all emergencies.—*The Dental Student*.

Isotonic

AN isotonic solution is one which does not cause the blood cells to contract or expand.

When a solution has a greater concentration of salts than the blood cells, it is *hypertonic*. When it comes in contact with the cells, there is a seepage of water from the cell into the surrounding solution, causing the cell to shrink and possibly to die, resulting in pain and sloughing.

When the solution has less salts than the cell, there is a seepage of water from the solution into the cell, causing it to swell and burst the cell wall, resulting in the death of the cell, swelling, pain and sloughing.

When the solution has the same salt concentration as the cell, there is no change, and it is called an isotonic solution.



I Saw a Picture

ONE night I was reading a paper before a Dental Society in a distant city. The friend who was driving me to my train after the meeting drew up to the curb before a residence, and said "I want you to come in here with me—I have something to show you."

We entered a beautiful, well-kept home—his home—and, beckoning me, he led the way upstairs. In a room we saw two little cots standing side by side, each with a dear little girl in it, sound asleep. It was a beautiful picture—one I shall never forget. Much against my protest my friend stepped up to the cots and pulled the noses of the sleepers. They roused up in a disturbed way, but the moment they confusedly opened their eyes and saw who was standing beside the cot they both smiled up at him—a smile such as must come from the angels when they are pleased. There was a world of understanding and comradeship in those smiles, much as to say—"oh, that's our Daddy—no one like him."

We went into another room, and saw two more cots with two more little girls in them. There was the same pulling of noses, and the same protest from me. "Now, Charlie, you stop disturbing those children," I whispered. But he merely grinned and pulled their noses till he had awakened them, and received their smiles.

Then we went to still another room—an outside sleeping-porch—and found a boy, a rugged little rascal with tousled hair. He smiled also when his nose was pulled, and looking up grinned at us, as if to say,—“Well, what’s eatin’ you at this hour of the night?” And then I learned something about Bill—something illuminating. He had been a rather diffident, retiring boy, and somewhat imposed upon by other boys of the neighborhood. One day he came rushing into the house chased by some boys. His mother went to the door and asked the boys what was the matter. “We want Bill out here to lick him—he sassed us.”

What do you think that mother did? Of course you have visions of her standing in the door with Bill behind her apron, and admonishing those naughty boys to go on away home and let Bill alone. But that is only a vision—what really happened was this:—She took Bill by the collar and shoved him out into that snarl of boys, and said. “Now, go out there, and take care of yourself.”

Bill stiffened his lip, gritted his teeth, and went out and licked the ringleader. No more trouble after that with Bill’s diffidence—he had found himself.

The only difficulty now is that the mothers of the neighborhood keep coming to Bill’s mother to complain that Bill has been thrashing their innocent cherubs—some of them older and bigger than Bill. When such a situation arises, she sends for Bill, and asks him to tell her what happened. After listening to Bill’s story she governs herself accordingly. If Bill says that the other boys started the trouble, she merely says: “Sorry, but Bill tells me that your boys are at fault, and I have to believe him, because he has been taught never to tell a lie to his father or mother.” If Bill started the altercation—which I imagine happens fully as often as it should—he tells her so, and then she apologizes to the mothers and placates them as best she can.

What would have been the result if on that first occasion that little mother had shielded Bill and driven the other boys away from her porch? Of course Bill would have some day found himself, because he is made of that kind of stuff, but he would not have found himself nearly so early, and he would have followed a very devious path in doing it. Bill’s mother is the right kind of a mother—her five children show that at every turn—and she knows boys. Bill will grow up to be a self-respecting citizen, and he will also respect the rights of others; which is the hardest lesson in life to learn.

I shall always remember the picture of those five children snuggled up in their cots. They represent the future hope of the country, the glory of the commonwealth, and the saving grace of our modern civilization. When we raise children such as those we need have little fear as to the welfare of the coming generations, nor waste much energy lamenting the deterioration of the race.

The father of those children is Charlie Lane, of Detroit, Michigan—one of the truest friends, and the best types of professional gentlemen to be found anywhere. But I shall never forgive him for pulling the noses of those sleeping children.

C. H. Johnson

ORAL HEALTH

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TORONTO, JUNE, 1924

No. 6

EDITORIAL

The Canadian Dental Hygiene Council

THE C. D. H. C. has been granted a charter by the Dominion Government, having been organized as a result of numerous conferences held during the past year between representatives of the Canadian Oral Prophylactic Association and those who have advocated that all public dental educational work should be undertaken by the dental profession itself, and not by organizations of dentists independent of the dental profession.

Both plans were freely and frankly discussed, with a view to arriving at a decision that would unify the profession and enable every member to stand side by side with his confreres in undivided support of a national public educational movement for better hygienic conditions in the oral cavity.

The result was the birth of a new movement in which prominent Canadian laymen are taking a leading part. It was decided that the ideal organization for public oral hygiene education was not the dental profession itself, nor any group of dentists, but an association in which laymen would take a prominent part. This was the new principle adopted and the Canadian Dental Hygiene Council was formed along lines very similar to the Canadian Social Hygiene Council and the Canadian Mental Hygiene Council. Dentists are mem-

bers of the Council, but the organization is primarily a laymen's association.

The following have consented to act in the capacities named:

Patron.....His Excellency the Lord Byng of Vimy, G.C.B.,
Governor-General of Canada.
Vice-Patrons.....The Lieutenant-Governors of various Provinces.
Honorary-President.....Dr. Beland, Federal Minister of Health.
Honorary Vice-Presidents.....Ministers of Health of the various Provinces.
President-General.....The Hon. S. C. Mewburn, K.C., C.M.G. (Hamilton).
Vice-President.....Mr. E. E. Reid, B.A., Manager London Life Insurance Co.
(London).

The Canadian Red Cross has officially appointed Colonel George Nasmith, C.M.G., as its representative upon the Council; and Mr. J. E. Atkinson (President of the *Toronto Daily Star*) has consented to serve as a member of the Council. At present, seven dentists are members of the Council, acting as an interim committee, with Dr. W. Cecil Trotter as Chairman, and Dr. E. A. Grant as Secretary-Treasurer.

The Council appointed a committee, composed of Drs. Trotter, Grant and H. S. Thomson, to lay the claims of the Association before the health authorities in Ottawa, with a view to obtaining a Federal grant similar to those given other similar associations. This development will place oral hygiene upon precisely the same basis as other departments of hygiene, and as an integral part of the Canadian public health movement.

Individual members of the profession may have had different ideas regarding the "right way" and the "wrong way" to carry on oral hygiene work, but these, after all, are only differences of view regarding methods. All are agreed in principle upon the great public need, and with every member of the profession united in support of General Mewburn and this new Canadian Dental Hygiene Council, wonderful progress is sure to follow. Give the Canadian Dental Hygiene Council your most generous support.

An interim report was presented at the recent Ontario Dental meeting by Doctor W. Cecil Trotter. The report will be published in full in an early issue of *Oral Health*.

British Dentists Extend Welcome

THE Council of the British Dental Association will be pleased to be of service to visiting members of the Canadian Dental Association, and extends to those visiting the London Exposition the use of their rooms and library.

Mr. Robert Lindsay, the Dental Secretary of the British Association, assures members of the Canadian Dental profession that:

"Any other assistance or information which it is in our power to give is most cordially at the disposal of our Dominion colleagues for this time and always."

The Largess of Life

Because I have given my life
To the joyance of living,
Its lords have given me youth
Past their measure of giving.

Because I have given my heart
To the rapture of gladness,
They have taught me the simples of earth
For the healing of sadness.

Because I have given my days
To the seeking of knowledge,
They have opened the doors for me
Of the wilderness college.

They have opened my eyes to behold
And my senses to love
More than the careless perceive
Or the learned can prove.

Because I have given my years
To the service of beauty
They have given me freedom of earth
Without limit or duty.

Because I have followed their trail,
Often faint, yet unswerving,
They have given me lovers and friends
Beyond all deserving.

Bliss Carman.



FRED J. CONBOY, D.D.S., *Toronto.*
Past President Ontario Dental Association.

ORAL HEALTH

A JOURNAL THAT STANDS FOR THE "OUNCE OF PREVENTION," AS WELL AS THE "POUND OF CURE"

Vol. 14

TORONTO, JULY, 1924

No. 7

President's Address—Ontario Dental Convention, 1924

F. J. CONBOY, D.D.S., *Toronto.*

Mr. Chairman, Ladies, and Gentlemen:—

THE position of President of this Association carries with it many obligations and responsibilities, but it also has a large number of redeeming features and rewards. Foremost among these compensations is the privilege of giving the annual message to the members of the profession, and I desire to make the best possible use of this opportunity by presenting to you what I consider to be a sufficient and efficient dental public health programme. But first of all allow me to express to you my deep appreciation of the honor conferred upon me by making me your executive officer. It is indeed no small thing to have been given the privilege of serving you in this capacity during the past twelve months, and I wish to take full advantage of this opportunity to express my gratitude. I do not intend to take time to review the activities of the year, but a study of the various reports will show that some very useful work has been accomplished and these different achievements will, I am sure, meet with your approval.

The profession of dentistry is rapidly rising to a proper estimation of its responsibilities to the general public. Ten years ago the dentist who performed the ordinary dental operations for the patients who came to his office considered that he was doing his full duty and was practising the science of dentistry in an efficient and satisfactory manner. But we now realize that dental science is dental wisdom set in order; it is known as science by its orderly arrangement, but above and beyond all matters of arrangement the wisdom itself must take rank. Wisdom and experience have taught the members of our

profession that as we are in a large measure responsible for the health of the general public, we must ascertain the relationship between systemic diseases and dental conditions and must strive to prevent these diseases by removing the cause in so far as the treatment of these disorders lies within the province of the practitioner of dentistry. Investigations conducted by reliable and competent research workers and our own observations, prove conclusively that dental diseases are a menace to the general health and that the physical welfare of the people cannot be properly safe-guarded until all the members of our profession realize and accept their full responsibility as co-workers with physicians in the field of preventive medicine. The dentist's main function is not merely to fill teeth or restore masticating surfaces, but to protect the health of his patients and the general public. Dentistry has now been exalted to the highest rank in preventive medicine; unfortunately a number of dentists have not as yet fully realized that the dental profession has this definite service to render to humanity, that we have it within our power to prevent premature deaths and prolong the average length of life.

How are we to fulfil our mission and render to the general public the service which they have a right to expect of us? There are three ways in which we can function. *First*, by actual dental work, the performance of the necessary operations in the most modern and efficient manner. *Second*, by advising and educating our patients, explaining the dangers that may arise from neglect and showing how dental disease may be prevented, and *third*, by educating the general public.

In connection with the first consideration little need be said in so far as the individual dentist is concerned. The dentists in all parts of the Province are making an earnest effort to render an efficient service and the large attendance at this Convention proves beyond the shadow of a doubt that the members of the profession are anxious to learn all that is modern and up-to-date in knowledge and method. But what about the thousands of citizens who for various reasons cannot have a family dentist? Those who are earning a very small wage, the children whose parents are poor and those living in communities too small to support a resident dentist? We, as a profession, have a responsibility and a great responsibility in regard to these people, but, the full burden should not be placed upon our shoulders; surely we must do the actual work and take a leading part in the organization, but governments, municipalities and public spirited citizens must accept their full share of the financial obligations. The members of this profession are prepared to give their time gratuitously in connection with the maintenance of a dental department in any hospital, providing that branch of the hospital service is equal in standing with all others. We are prepared to organize travelling clinics so that the people in outlying districts may be properly cared

for, only stipulating that the practices of the resident dentists in these localities shall not be interfered with. We are willing to freely give our time to make initial surveys so that facts and statistics, which will conclusively prove the need for a school dental service in any community, may be assembled and tabulated, and we are anxious to assist in the organization of work to be carried on in connection with the various factories and shops, so that the industrial workers may be informed in regard to the menace of dental diseases and the best means of protection. We appreciate the pressing need for pre-school clinics, being firmly convinced *that all children should come under the care of the dentist before they are three years of age*, and are willing to accept our full share of responsibility in connection with the establishment of these clinics. The deciduous teeth must be preserved; they serve the child during the period of greatest development, but unfortunately in many cases they are hopelessly decayed and infected before the child enters school. A pre-school clinic means a smaller number of poorly nourished children, less sickness and fewer premature deaths from preventable diseases. But in all these activities we have a perfect right to expect assistance from governments, municipalities, welfare organizations and all citizens who are interested in the well being of their fellows and especially concerned about the health and happiness of the boys and girls.

In connection with the second consideration, that of advising our patients in regard to the proper care of the teeth, I would like to point out the absolute necessity of teaching dental health habits to the children. It appears to me that the home and school provide so much supervision and care that the children, unless permanent health habits are formed, will neglect to properly care for themselves when left to their own resources. They will become so accustomed to the regular school inspection and the arrangements for the work being made without any effort on their part, that unless special instruction is given or some follow-up system devised, much of the beneficial results of the school service will be lost.

In considering our responsibility in regard to the educating of the general public, we must bear in mind that it is quite possible to create a new outlook, to change opinions and to move human energy in any proper direction by organized public persuasion. The most potent force in educating the masses is the news columns in the daily or weekly papers. The Press is always willing to assist in connection with any worthy undertaking, and there is no publicity work of as great importance as health education, but the newspaper men must be convinced that we are actuated by a praise-worthy motive, and are not trying to serve ourselves, and material presented must be attractive and readable. Lectures to teachers, Conventions, Home and School Clubs, Women's Institutes, Nurses' Associations, and other organizations, form a very important part of our educational work, as these

bodies exert a great influence in moulding public opinion. A perusal of the printed report presented by the Oral Hygiene Committee will convince you that ample provision has now been made for addresses to be given by members of the profession, and the necessary information together with still or moving pictures will be supplied by the Committee upon request.

Public spirited men and women are now taking a greater interest in Oral Hygiene work and the favorable response made by a number of prominent citizens when asked to assist in the organization of the Canadian Dental Hygiene Council is an evidence of the fact that many persons outside the profession are anxious to help along this movement which has as its primary object the development of a higher standard of public health. A full report of the Canadian Dental Hygiene Council will be presented at this Convention. This combined action on the part of prominent laymen and dentists will, I am sure, meet with your approval, and every dentist in Canada should give it his enthusiastic support.

As a profession we are beginning now to realize our full responsibilities and to recognize our grand opportunities for service, and I know that I am meeting the desires and expressing the opinions of the dentists of Ontario when I say we will not refuse to accept our responsibilities, nor will we neglect any opportunities which may present, which will enable us to render an efficient and altruistic public service.

A Review of the Present Status of Dental Practice

THOMAS COWLING, B.A., D.D.S.

Royal College of Dental Surgeons, Toronto.

ANY report on dental practice must, of necessity, be characterized by confidence and optimism—confidence in the ability of dentists to solve present difficulties and optimism as regards the future of the profession.

Such a view is but natural because we are justly proud of the fact that no profession or calling has surpassed the record of progress made by dentistry. We recall that only a few years ago we were clamoring for recognition; to-day more attention is being given to dentistry than to any other branch of the healing art. Quite truthfully it may be said that the past few years have been years of great achievement and noted also for the hopefulness of outlook.

It is the veriest commonplace to say that any science, to be truly

effective, must be progressive; indeed, it is a biological law that each generation must surpass the achievements of its predecessors. Progress, in a physical sense, is dependent upon resistance. The ship's propeller must have the resistance of the water; in walking, progress is dependent upon the resistance of the ground. The substantial progress made by Dentistry has been due, in part at least, to the fact that it has had to contend with much opposition. For many years it was the object of criticism, much of which was unfair and undeserved. We were inclined to regret the tardiness of medicine in recognizing dentistry as an efficient ally, but this has really been beneficial in that it has urged us on to greater things. Dentistry has ever been characterized by a ready response to criticism, also by the ability to surmount obstacles and to satisfy each new demand. Instance the quick response to the focal infection challenge, as a result of which dentistry was recast overnight and made ready to cope with new requirements.

It is true that many new theories have been advanced and new methods of practice introduced, many of which have been discredited and abandoned because they were unscientific and impracticable.

But in this respect dentistry is no more culpable than other sciences, for the introduction of fads and fancies has been the common heritage of all the liberal arts and sciences from time immemorial.

Records show clearly how our profession has progressed. Dentistry was at first considered a part of Medicine; then it drifted away and became more or less an art of Mechanics, special emphasis being placed upon the restoration of impaired and missing teeth. At this time prosthesis developed as an independent branch of dentistry. Emphasis was also placed upon the restoration of teeth with gold, silver and cements. Pride in the architecture of the restoration was the characteristic feature of the dentistry of this period, and little knowledge of physiology, anatomy or histology was deemed necessary. In brief, it was the period of the craftsman or artisan dentist.

For a time Dentistry "pursued the even tenor of its course" undisturbed by any very serious problems until Dr. Hunter, an English physician, rudely awakened us from our peaceful slumbers. He put the entire profession on its mettle by boldly asserting that many systemic ailments were directly chargeable to oral sepsis. It was a veritable impeachment of prevailing dental methods. For a time Dr. Hunter remained the lone accuser, but eventually the truth of his accusations became evident so that to-day every branch of dental, medical and the allied sciences have turned their attention to the correction of this grave condition. In a sense, then, we may say that dentistry and medicine have once more joined forces to fight a common foe. As a result, a new era has opened up for dentistry and more attention is now being given to the study of pathology, bacteriology and histology than at any previous period. Research with a view to explaining how and why focal infection has a direct bearing upon

local and general disease, has been instituted wherever dentistry is studied.

For a time restorative work has had to occupy a position of secondary importance. The purely mechanical in dentistry has been superseded by the patho-histological study of the structure of the teeth and surrounding tissues as these are related to focal infection. Necessarily this involves the consideration of efficient methods of root-canal filling, crown and bridge work and artificial denture retention. The teeth are no longer treated as inert fragments of the body, but as living organisms closely related to body health.

Occasionally we hear it said that dentistry is no longer mechanical. It might be restated with greater truth that the purely mechanical in dentistry has taken on a new importance in that it is linked up with the biological. Mechanical dentistry is not being neglected; indeed restorations now show more care as regards detail, and are more efficient than they have ever been. There is marked evidence of greater concern as to the effect of restorations upon the oral tissues and it is not falsifying the true condition to say that mechanical dentistry during the past few years has made real progress.

Perhaps the most conspicuous innovation in dentistry is the amount of time being devoted to the intensive study of the fundamental subjects. Our educational plan has been entirely recast. It now aims at inductive thinking, which is the basis of true research. Surely no profession can boast of a better foundation. Consequently of dentistry it may be said that it is entering upon an era of conservative methods based upon sound scientific principles. Diagnosis looms up as a department of first importance wherein scientific research is buttressed with clinical experience. Here theory and practice, cause and effect go hand in hand. Preventive dentistry, though the newest addition to our curriculum of studies, has already shown sturdy growth and gives promise of even greater development in the near future. There is also a feeling growing among dentists that the radical treatment of dental ailments by means of extraction is not the proper course and that our chief aim must ever be the conservation of the teeth.

Our profession is a complex one, combining, as it does, mechanical skill, artistic sense, and a knowledge of chemistry, physics, engineering, surgery and medicine. As a result there has been the inevitable division into specialities such as diagnosis, therapeutics, restoration and prevention. Obviously it is impossible in a report of reasonable length to deal with all these departments, so a few only will be referred to here.

DIAGNOSIS.

One of the outstanding weaknesses of dentistry is the lack of appreciation of the importance of diagnosis. The X-ray has been, or ought to have been, a great source of strength, but in many instances

its use has been sadly abused. As evidence of its importance, the X-ray is recognized by our judicial courts as comprising part of the average dental office equipment. In dentistry the advantages of radiography have not been fully utilized. We have become accustomed to use it solely to get ourselves out of trouble, rather than for the purpose of keeping out of trouble.

We have learned that in the hands of the inexperienced diagnostician the X-ray may prove dangerous and in the hands of an unscrupulous person it may be made to serve purely mercenary ends. We have also found that erroneous interpretations often result in a grave injustice to the patient.

The question of the qualification of the interpreter is an important one, because many X-ray laboratories are conducted by those who have received no training whatsoever in histology, pathology or anatomy. These men not only take the pictures, but also make the interpretation. In support of this arrangement it is often argued that the average dentist does not do enough of this work to become expert, hence the need of the laboratories.

It is a very questionable policy to condemn all teeth when the skiagrams show a thickening of the periapical tissue, because it is possible that when this tissue becomes affected, there is an infiltration of leukocytes and lymphocytes with the result that there is an increase in the size of the periodontal membrane about the apical portion of the tooth. This is, in effect, Nature's protective measure, the same as occurs about any infected tissue. There may not necessarily be any destruction of tissue and most likely there will be, after a time, a return to normal conditions. Evidence is accumulating that teeth which show but a small area near the apex and where there is no indication of absorption of the apical cementum, can be saved. The prognosis is especially favorable in patients of good resistance and where the infected area is comparatively new.

With the many improvements made in X-ray therapy there looms up the possibility of using these rays or similar ones in the treatment of oral conditions more extensively than they now are used.

Now that so many institutions are making X-ray examinations of the teeth, there is an urgent need for some sort of standard mounts for dental radiograms. Standardization would greatly facilitate the filing problem.

PULPLESS TEETH.

That there is a definite relationship between tooth infection and general health is readily conceded. To explain the exact connection of these two is one of the most important problems in dentistry and medicine.

In our enthusiasm to correct certain systemic ailments dental and medical practitioners alike are prone, sometimes, to emphasize the

dental sources of infection to the exclusion of all others. This may be enthusiasm, but certainly is not good reasoning. We have learned that the enthusiast who is without capacity, is really a dangerous person. With a fair degree of accuracy, it might be stated that there is a change in opinion observable within the last few months with regard to the status of the pulpless tooth. There is less readiness to extract these teeth and a more pronounced tendency in the direction of conservation. Many are now of the opinion that most pulpless teeth can be saved and made serviceable without endangering body health.

In the body there are many sites where chronic infections may have their source so that it is not reasonable that the teeth should always be looked upon as the sole offenders. Primary foci may be found in infected tonsils, in the air sinuses of the face, in the walls of the pharynx and respiratory tract, in the gall-bladder and genito-urinary tract. Increasing evidence is accumulating regarding the close relationship between gastro-intestinal stasis and oral health. Some even go so far as to state that the mouth is a good index of the intestinal condition.

It is clear, therefore, that the teeth should not be regarded as the source of all primary foci of infection and that they should not be charged with all the hidden and untraceable disturbances of the body. Still the teeth as a factor in general health cannot be overlooked. There is no doubt but that a blind abscess or the granuloma on a tooth—the result of progressive diseases in the periapical tissues—are ideal breeding places for bacteria and should be treated accordingly.

For years we have been trying, each in our own way, to explain why focal infection is linked up with local and general diseases, but our efforts have not always been what we would desire. That diseased teeth do not in every case cause systemic troubles is due to the fact that the infection about a tooth may remain localized; but there is ever present the possibility that at some time the infection may spread through absorption, due to its virulence and quantity. With the lowering of the patient's resistance the danger is increased.

The importance of the problem of the pulpless tooth is apparent to us all. It is admittedly the most vital question before dentists to-day and until such time as a satisfactory solution is obtained and a technique of root-canal treatment evolved which will eliminate all danger of immediate or subsequent infection, our position in the estimation of the medical profession will not be favorable.

ROOT-CANAL TREATMENTS.

Many very excellent methods of root-canal filling have been described by outstanding members of the profession and no doubt each and every exponent of a particular technique is able to secure satisfactory results in his own way. Others try and fail. Personal

skill seems to be the predominating characteristic of many of the methods introduced—each gets results by following his own technique; others, however, are unable to imitate the method. In essence, therefore, we have, as the sum total of dental endeavors, a series of individual procedures that do not lend themselves to standardization. The great need in dentistry is the establishing of simple yet efficient methods of root-canal treatments that can be made generally acceptable. If this be done, then public health will benefit and dentistry take on a new importance in the eyes of our medical confreres.

The chief difficulty in root-canal work centers about the physical possibility of removing all the debris from a capillary tube or root which possesses multiple foramina, and completely sealing the same. Many authorities are of the opinion that with our present methods this is an impossibility. All are agreed, however, that the prognosis in root-canal work is more favorable in single than in multi-rooted teeth, due to the ease of access to the canals.

In all candor we must confess that, though this problem of root treatment is of paramount importance, much of the research work pertaining thereto has been done by commercial concerns and not by the dental profession. Whilst it is true that such work is better done by interests outside the profession than not done at all, still it would be better if undertaken by those not particularly interested in marketing a product.

From the mass of information available on the subject one is forced to the conclusion that there exists in the minds of dentists, a general dissatisfaction with most of the prevailing methods of root-canal work and that they are willing to go on along old lines until something of real worth is forthcoming. A simple, efficient, and standardized technique is very much needed.

The impossibility of filling fine root-canals with gutta percha solutions alone, due to the contraction following the evaporation of the solvents usually used, has long been recognized. One of the newer methods in vogue depends upon the diffusion and precipitation of filling materials, in canals that have been previously rendered sterile.

According to this method, substances such as resin and gutta percha in solution, are diffused throughout the fine canals and the solvent is then removed by suitable reagents. As a result the deposited solid material clings to the walls of the canals. In this way it is hoped to obliterate all space within the tooth excepting the tubuli.

There have also been evolved certain methods of treatment whereby, it is hoped, through a process of stimulation of the tissues, a deposit of secondary cementum may be formed that will close up the apical foramina. These methods have not, as yet, been sufficiently investigated to warrant their general use in dentistry.

One note of unanimity is to be found in all the discussions on root-canal work, namely: that the Howe method of staining is suitable for

use as a supplementary treatment. This method is the precipitation of an ammonical solution of silver nitrate with formaldehyde or other suitable reagent.

Apparently the consensus of opinion regarding root-canal treatment is that the best results are obtained where there is an absence of any constitutional disturbance and where the patient's resistance is high: also that it is a grave injustice to treat infected root-canals for patients suffering with pronounced systemic infections, especially in those cases where all other likely foci of infection have been eliminated and no improvement has been noted in the patient's condition. Therefore, until such time as our methods of root-canal filling shall have improved, it is best to remove such teeth.

CAVITY PREPARATION.

With the knowledge of the seriousness of focal infection there have come certain modifications in cavity preparations. The supreme aim is to conserve the vitality of the pulp, hence the introduction of the pin-ledge fillings, three-quarter crowns, and other restorations of a similar type which give security of anchorage with the added advantage of pulp protection. From the esthetic standpoint they are also desirable.

Excellent clinics exemplifying the modern view of cavity preparation have been arranged for this Convention and the best methods will be skilfully demonstrated by expert clinicians.

STERILIZATION.

The sterilization of dental instruments is being well done, but there is still room for improvement. The sterilization of hand pieces is seldom, if ever, attempted by some operators, although these hand-pieces frequently become saturated with the patient's saliva. No doubt the neglect is due to the intricate construction of these pieces, but this is not a sufficient excuse. Regular swabbing of the parts with alcohol will ensure cleanliness and prove harmless to the mechanism. Impression materials should receive the same care as regards sterilization, as do the dental instruments, but it is a fact that this is seldom the case.

DENTAL CARIES.

During the past year a notable contribution to the literature dealing with the bactericidal origin of dental caries was made by Doctors James McIntosh, W. Warwick James and P. Lazarus-Barlow of England. Their investigations show: (1) the constant presence of a definite type of bacillus in caries; (2) that this bacillus is capable of forming a high degree of acidity by the fermentation of carbohydrates; (3) that teeth left in contact with cultures over a prolonged period show changes almost identical with "natural caries," namely: erosion of enamel and penetration of the dentinal tubuli with the formation of liquefaction foci; (4) that this bacillus resembles the

acidophilus group of Moro, but biologically there are several points of difference; (5) that the successful production of artificial caries by pure cultures of the organisms isolated, goes far in establishing the microbic theory of caries.

The result of this research comprises a valuable addition to our knowledge of the etiology of dental caries. From the biological standpoint it marks a distinct advance because, heretofore, we have had to infer the bacterial source of caries; now the causative factors have been isolated and the specific organisms named. We also know something of the conditions under which the bacteria work. These findings prove the correctness of Doctor Miller's theory, and if the research work now being carried on meets with the same degree of success as has attended the earlier efforts, dentistry will soon be within a measurable distance of a method of treatment calculated to prevent caries.

Another theory as to the causative factors involved in caries, claims that endocrine derangement causes bones to either harden or soften. This theory emphasizes the importance of calcium in maintaining healthy tooth conditions. It is pointed out that enamel in health, progressively hardens as life proceeds, due to the laying down of calcium from the body store held by the endocrine apparatus which is also the "fixer" of the lime salts in the teeth. When the endocrine apparatus is thrown out of balance by calcium starvation, the reserve calcium is used up and the fixation of lime salts in the teeth is interfered with. Calcium starvation leads to deficiency of calcium in the saliva causing a gradual diminution of alkalinity, hence susceptibility to caries.

Whether this theory can be generally supported is doubtful, but it holds interesting possibilities in that it relates the problem of caries to nutrition.

Until other and better solutions are forthcoming, the old theory of Doctor Miller is a good one to depend upon. In effect this theory is: dental caries primarily results from the attacks made upon tooth structure by acids formed by bacteria derived principally from carbohydrate foods. Where the carbohydrate food material clings to the tooth, there caries is found. Adhesive and sticky foods tend to facilitate acid production, especially in deep crevices where the acid may remain unneutralized for a long time because these areas are not likely to be irrigated with saliva.

Clinically, there is much evidence to support the theory of Dr. Miller, for if there is a diminution in the amount of carbohydrate food there is practically always a noticeable reduction in the number of cavities in the teeth. We are also all aware of the fact that the increase in the forces causing tooth decay synchronizes with the introduction of refined starchy foods and the increase in the concentration of sugary foods.

THE SIXTH YEAR MOLAR.

The importance of the sixth year molar is not sufficiently emphasized. It is rightfully considered to be the most important tooth in the dental arch because its early removal causes a disturbance of the complete masticatory apparatus.

Some authorities claim that the enamel of the newly erupted tooth is imperfect and therefore less resistant to attacks of acids than it is at a later period. If this is true, then the need for greater care of the sixth year molar at once becomes apparent.

The devitalization of this tooth is little less than a calamity, for many who have studied this question claim that if a child under fourteen years of age has the pulp removed from the first permanent molar, that tooth will not last until the thirtieth year.

In the filling of the newly erupted molars, it is well to avoid the use of synthetic porcelain because of the tendency to devitalization. Lining the cavity before inserting the synthetic porcelain helps to protect the pulps, but in case of the six year molars, other filling materials are preferable.

PORCELAIN.

There has been a marked increase in baked porcelain restorations and more beautiful work is now being done than at any previous period. This is due in part, to the supply of easily controlled porcelain bodies and also to the introduction of improved and convenient furnaces.

GOLD FOIL FILLINGS.

Whilst it must be said that cast gold inlays have made a favorable impression and have become part of every dentist's armamentarium, still there is a noticeable return by many of our best operators, to gold foil fillings. A good foil restoration shows competence and is a lasting tribute to the operator's skill. These fillings are also a great help in developing manipulative skill, hence it would be a serious mistake to minimize their value when instructing dental students.

APICOECTOMY.

As a means of saving anterior teeth, apicoectomy has proven its worth. Recognition should be given the fact, however, that this operation is successful only as the culmination of a perfect root-canal filling because of the need for absolute sterilization.

THE DENTAL MECHANIC.

The position of the dental mechanic is a rather paradoxical one. He makes most of the intricate and complicated prosthetic restorations, yet receives no instruction from our dental teachers. A dentist,

on the contrary, receives four or five years of detailed instruction from expert teachers, yet seldom follows a case farther than the impression and bite stage.

We do not like to admit it, but it is a fact, nevertheless, that the majority of dentists never make a denture, bridge, crown or inlay. The mechanic does the work. In defence of our present system it may be contended that the training received by the dentist qualifies him to superintend the work done by the assistants, and there is, perhaps, much truth in such a statement. Unfortunately this supervision, in most cases, is more theoretical than real.

The time is now opportune for a careful survey of this problem of instruction of dental mechanics. The present state of affairs is illogical and indefensible.

THE DENTAL NURSE.

Some unkind person has defined the dental nurse as one with the qualification of a housemaid and the presumption of a specialist. This, of course, is an unfair valuation of their services, yet it is quite evident that the training of dental nurses must be made more thorough than it now is.

In some quarters it is even whispered that the training unfits them for the ordinary duties required by the general practitioner; rather, that it produces assistants for specialists only. To be truly effective the training given these nurses should fit them for duties other than that of adding adornment to offices which in many instances are already overly adorned.

All are agreed that the dental nurse should not attempt operations at the chair. Her real duty is to act as an assistant to the operator and she should never attempt to usurp his duties. Some dentists allow the nurse to do prophylactic operations, holding that this is permissible, provided such treatment does not extend beyond the gingival line. This is but the insertion of the thin edge of the wedge and should be discouraged.

ADVERTISING DENTISTS.

The number of dentists who advertise in our daily papers, through the distribution of pamphlets, in moving picture theatres, on pillar-boxes, and on concert programmes, is steadily increasing. These men place the entire profession at a disadvantage and in a very unfair position, hence their activities should be stopped. In view of the fact that medical and legal practitioners are subject to rigid discipline by their confreres, it seems but reasonable to expect the same sort of censorship over the members of our own profession. If necessary, suitable amendments to the statutes governing Dentistry should be secured in order to give mandatory powers to our executives.

EXODONTIA.

The recent enthusiasm for extraction of teeth was, in effect, a confession of our incompetence. Dentistry should ever have for its true objective the saving of teeth rather than the removal of them, except in cases where they are a menace to health.

It would be difficult to estimate the ill results that will follow the wholesale extraction so popular during the past few years. Had this continued it would have had a disastrous effect upon the human race, for we know that there is no satisfactory substitute for the natural teeth. The trouble has been that too small a value has been placed upon them. A surgeon never undertakes an operation involving the removal of an important part of the human organism without first calculating the after effect upon the patient. In dentistry we are too apt to remove the teeth first and then attempt a substitution. Many times the results are conspicuous by their failure.

It should be recognized that successful exodontia depends upon sound surgical principles, and a thorough knowledge of pathology. No tooth should be extracted just because it is suspected, and too many infected teeth should not be removed at one time because of the danger to the system.

Many teeth are extracted on the advice of the physician to alleviate systemic disturbances. The dentist should not act upon the suggestion of others until he has examined the teeth thoroughly and definitely decided their worth. This surely is a commendable attitude.

With the introduction of new root-canal treatments, resulting in a greater possibility of saving pulpless teeth, the forceps should not be taken in hand too speedily. When these new methods have had a fair trial and when this question has been given the attention that its seriousness warrants, then the forceps should be resorted to, provided it shall have been proven that root-canals cannot be successfully treated. Until such time, however, conservation is the watchword.

Admittedly there are many cases where extraction is the best possible treatment because of the danger of dental focal infection. We have learned that it is best to sacrifice the doubtful pulpless teeth of patients suffering from metastatic diseases and where the X-ray and clinical evidences are unfavorable. It is the dentist's duty to examine and report to the physician, all infectious conditions of the teeth of patients suffering from any metastatic disorder.

PREGNANCY.

There has been an old and misleading dictum, the heritage of years, that we should avoid extracting teeth for pregnant women. Experience goes to show, however, that for even these cases it is best to extract teeth that are infected and beyond repair. The ideal anaesthetic in such cases is nitrous oxide and apparently the duration of the anaesthesia has little or no effect upon the patient.

IMPACTED TEETH.

Impacted and unerupted teeth, due to their susceptibility to infection, are best removed. Skiagrams taken at different angles are of inestimable value in such cases because they aid in determining the position of the teeth in relation to the surrounding tissues.

ALVEOLECTOMY.

Alveolectomy is rarely indicated and only when the subapical bone is largely infiltrated or destroyed. The needless removal of alveolar bone is a very serious thing because of the difficulty encountered when making artificial replacements. Indeed, many prosthodontists are complaining about this. Needless to say, the extent of alveolar destruction should first be accurately determined by radiographic indications.

CURETTEMENT.

Much of the prolonged, intense pain following the extraction of teeth is due to extensive curettage, which is often uncalled for and unnecessary. It would seem reasonable to infer, as a general rule, that if a tissue is healthy enough to be infiltrated with an anaesthetic, there should be no need for curetting.

Some dentists remove not only the granulation tissue, but also the bony wall and curette the cancellous tissue of the bone beyond it. The purpose, of course, is to remove all infection even beyond the actual area of rarefaction. There is, however, usually no need for breaking down the bony wall which Nature has placed around the apical area.

Infected sockets, we know, should be curetted thoroughly, but much curetting is done in a haphazard fashion and amounts simply to a scraping of the walls of the socket. At all times great care is necessary, especially in the antrum region, because of the danger of forcing infectious material in the antrum.

The flooding of teeth sockets with irritating antiseptics is not good practice. Swabbing with iodine gives satisfactory results but generally clean blood is about the best wash for the injured tissues.

ORAL SURGERY.

As a result of the lessons learned during the war, many dentists are now devoting their entire attention to oral surgery and their efforts are meeting with well-deserved success. Skilful preparation of the mouth for artificial dentures is of great importance and is very much appreciated by the prosthodontist.

BLOCK ANAESTHESIA.

To the improvements in the methods of block anaesthesia must be credited much of the success of oral surgery. Now difficult and prolonged operations are being performed under local anaesthesia. Suc-

cess with this method depends upon an intimate knowledge of anatomy as well as of systemic reactions.

One disadvantage of block anaesthesia is that occasionally the operator breaks a needle deep in the tissues. The recovery of the broken portion requires great skill and is accomplished in some cases only after extensive resection of the tissues. The comparative frequency of such accidents indicates an urgent need for stronger and heavier needles. We have learned that straight needles are less hazardous than are the curved type.

By way of overcoming the danger of broken needles, it has been suggested that a piece of fine wire be attached along the entire length of the needle. Then if it should break, the broken piece can be easily traced and removed. No doubt as the urgency of our wants becomes recognized, more satisfactory needles will be forthcoming.

ORTHODONTIA.

Deformities, especially in the young, always elicit sympathy. A distorted limb is almost an unusual thing in these days of surgical clinics. Irregular teeth are, in a sense, a deformity and often mar one's natural attractiveness. Indeed we know that in many instances irregular teeth may also lead to grave systemic disturbances. These things we recognize as true, yet few of us are interested in a practical sense; that is, we do not go so far as to offer our services for the purpose of effecting the amelioration of these ills.

Orthodontia has long been known as an exclusive art, the benefits of which can only be received by persons of means, and it has become an established practice for dentists to refer to orthodontists only those patients who are endowed with ample funds. This is unfortunate because the real duty of dentistry is to provide treatment for all and not for a few only.

A very successful attempt is being made in many parts of the United States to popularize orthodontia. Some colleges have established one-year courses in this subject; others have included it in post-graduate work, and the results so far have been very gratifying. One cannot help expressing the hope that Canadian dental colleges will find it possible to emulate this praiseworthy example.

We are on the threshold of a new era in orthodontia. Preventive orthodontia looms up as a real factor in dentistry, and the fact is becoming more and more apparent that preventive orthodontic measures are of great importance. The study of nutrition as related to dentition is being stressed, and orthodontists are insisting upon strict adherence to a balanced diet as an aid to the mechanical treatment of the teeth. The fact that the alveolar tissue development is especially susceptible to nutritional disturbances, has, heretofore, not been sufficiently emphasized in our teaching.

In many cases, prophylactic measures extend to the expectant mother, for it has long been recognized that some of the most difficult conditions with which orthodontists are confronted are pre-natal in character.

Orthodontic treatments show the best results if begun at an early age, say eight years; but even before this age some scheme of muscle development will prove of inestimable value. In brief, this is a method for stimulating the muscles of mastication and may be brought about without the use of any appliance whatsoever.

It results in a gradual expansion of the lower arch due to the vigorous and systematic exercise of the masseter-temporal muscles when the teeth are held firmly in occlusion. Facial development results also through the stimulation of the various groups of facial muscles. A great difference is observable in the appearance of cases treated solely by mechanical interference and those that have had the additional benefit of muscle development.

The idea of muscle development is, to say the least, a reasonable one and is easily carried out. Such treatment could be instituted as part of school dentistry.

Orthodontists select the maxillary deciduous cuspid as being, in most cases, the dominant factor in producing correct occlusion in the anterior teeth. The general practitioner, therefore, should give heed to this and endeavor to retain this tooth in a healthy condition until such time as its true function shall have been performed.

The eighth year has already been suggested as the proper time to begin orthodontic treatment proper. At this age there is rarely any abnormality present; there is simply a lack of development of the arch. This may readily be overcome. At an early age it is not so much a problem of correcting irregularities of the teeth as it is of remedying the under-development of the jaws and arches. If the treatment is delayed, say, to the twelfth or fourteenth year, there is an abnormality to correct in addition to the irregularity of the teeth, and the difficulties present are hard to overcome because the muscles and tissues are more or less fixed.

CROWN AND BRIDGE WORK.

The old question of the relative merits of fixed and removable types of bridge work occupies a conspicuous place in dental literature, but, in all candor, we must admit that only a few really new ideas have been evolved. The chief characteristic of this literature is the amount of attention given to the application of the fundamental principles of mechanics, physiology, pathology, hygiene and other correlated subjects. So the outlook is not by any means discouraging.

The exponents of each type of restoration are legion; consequently the published articles on bridge work are numerous and varied. But from the great mass of information it is difficult to extract anything

very definite and conclusive. A somewhat chaotic condition obtains because no attempt has been made in the direction of the standardization of methods. Perhaps it is but fair summing up of the controversy to say that the fixed type of bridge is growing in favor.

A successfully constructed bridge is one that depends not solely upon the beauty of appearance, but upon something more fundamental, *i.e.*, obtaining dental asepsis and guarding against focal infection. No matter how skilfully constructed, bridges, whether removable or fixed, act merely as a crutch. There is a dependence upon other teeth for retention.

The chief reason for using the removable type of bridge work was to do away with the strain on the abutments and to supply a restoration that could be easily cleansed. To obtain both of these desiderata in any one type of removable appliance is a delusion. It is practically impossible to construct any removable bridge so that all the strain of mastication is taken up by the saddle portion and so eliminate all strain on the abutments. It is true that some very efficient attachments have been invented involving a species of double joint socket, which relieves the abutment teeth of direct strain and also aids in the retention of the case, but unfortunately most of these devices are patented and not easily obtained, being supplied for the exclusive use of a few mechanical offices.

Practically all known types of removable bridge work place an unnatural load or strain on the teeth that are used either as direct or indirect retainers. The clasp-bridge, so called, is in reality a partial denture and these partial dentures are replacing removable bridge work to a large extent.

The saddle of the removable bridge does not play as important a part in the support of the bridge as was at first thought, and it does not relieve the bridge abutments of the entire stress of mastication. On the contrary, if occlusal rests are used, as is the case usually, the strain on the abutments is comparable to that of a fixed bridge. Experience has shown that in many cases the saddle is most certainly a disadvantage in that it promotes absorption through increasing the stress on the underlying tissues. We have all observed this clinically. When the case is first inserted, the teeth are in correct occlusion, but after a time a marked settling of the saddle develops, especially if the occlusal rests are removed. It is necessary, therefore, to account for this absorption as due to the unnatural pressure upon the tissues. A removable bridge is really a fixed one when under the strain of mastication and it may have the added disadvantage of extensive destruction of the abutments due to the use of attachments.

The only real improvement that can be pointed to in the removable appliances is that the opportunity for cleaning them is better. When we see how this possibility is taken advantage of by most possessors of full and partial dentures, our faith in the cleansing possibili-

ties or rather, probabilities, is sadly weakened. The possibility is there, but it is not taken advantage of.

Briefly then, we may say that unless our technique is vastly improved so that it will become possible to preserve the health of the abutment teeth and at the same time prevent the excessive pressure on the tissues under the saddles, better than we now are doing, removable bridge work will show little improvement over the better fixed types.

The most severe criticism of fixed bridge work has been due largely to the resulting unhealthy condition of the abutment teeth and the surrounding tissues. Unfortunately in a large number of instances this criticism has been amply warranted because the pathological and physiological requirements have been utterly ignored. Too much has been expected of the teeth used to support the bridge. However, when considering the question of the strain placed upon the abutments when a fixed bridge is used, we ought to bear in mind that every structure in the body is capable of functioning to a degree somewhat in excess of the normal. If this extra load is not excessive, no ill results will ensue. Indeed, we often find that the condition of a tooth, both as regards health and stability, is improved by giving it extra work to do. Particular attention must be paid to the articulation of the bridge because severe traumatism may set up irritation and result in the loss of the teeth used as abutments. It may be truthfully said that one of the most prolific causes of failure in both fixed and removable bridges is due to abnormal relationships of the incline planes of opposing teeth.

Perhaps we have been mistaken in expecting too much of fixed bridges. Undoubtedly this type of restoration has an important place in dentistry but it also has its limitations. As a rule short fixed bridges are satisfactory; for larger spaces, removable types are preferable. Rests should always be used in fixed bridges so as to prevent the rotation of the root of the supporting tooth. Where possible, the bridge should be fixed to one abutment and allowed to rest on the other. This induces a healthy condition to both teeth because it allows of some independent movements.

As already stated, one of the outstanding objections to the use of fixed bridge work has been due to the lack of cleansing facilities. Recently there has been introduced a porcelain tooth with a porcelain tip and a porcelain root extension which aids very much in solving this difficulty. In the preparation of these teeth, emphasis has been placed upon tooth form so that it is possible to use these porcelain teeth in fixed bridge work and reproduce very accurately in the porcelain pontics or dummies, the normal embrasures, normal lingual surfaces, and adequate masticating surfaces. These teeth may be closely adapted to the gum tissue without causing irritation due to the tolerance of the tissues for polished porcelain surfaces.

Porcelain pontics are particularly useful in anterior fixed bridges and are best used soon after the natural teeth have been extracted.

The porcelain roots are imbedded in the sockets and the tissues, after a time, will be found closely adapted to the porcelain and showing no signs of irritation. Owing to the correct anatomical form of these porcelain pontics, the natural embrasures are reproduced thus making for ease of cleansing.

In posterior cases, where complete absorption has taken place, the porcelain teeth may be placed so as to rest against the tissues and slightly impinge upon them. Having a smooth, polished surface they do not irritate the tissues and the perfectly formed embrasures and smooth, rounded surfaces practically preclude the possibility of food retention. One of the most efficient means of attaching bridges, especially in the anterior part of the mouth, is the inlay, preferably with some sort of pin-ledge anchorage, or the three-quarter crown, which, if properly constructed, will have a good appearance, be adaptable, and not require pulp devitalization. In posterior cases, the three-quarter crown, Carmichael, or three-pin inlay serve the purpose. The three-quarter crown has particular value as a bridge attachment because it necessitates no devitalization, requires little mutilation of the tooth, has strength, is adaptable to almost every tooth, and is easily removed when necessary.

The method of construction of these porcelain pontics is fully explained in clinics which are being given at this Convention by the Crown and Bridge section. Much interest centres about this form of restoration because it is really an innovation that is meeting with general approval.

PROSTHETICS.

One good resulting from the recent enthusiasm for extraction is the progress made in full and partial denture prosthesis. Many new ideas have been evolved and real progress has been made. It is also gratifying to observe that there is no evidence of complete satisfaction with things as they now are. This is a hopeful sign because contentment often means retrogression; concern begets progress. Prosthodontists refuse to admit finality in their department and are ever striving for better results.

Full denture prosthesis has shown great development during the past few years but much yet remains to be accomplished. It might be stated truthfully that we understand the principles of retention but do not fully understand the principles of impression-taking. A minimum compression of the tissues seems advisable when taking impressions so that there will be as little distortion of the tissues as possible. We should recognize the fact that compression means interference with the blood supply and may even lead to atrophy of the tissues. A careful investigation of the properties of the common impression materials now in use, with a view to their improvement, is very much needed.

Many of the methods of impression taking now recommended are complicated and involved. Some require the use of expensive materials and patented devices which can only be secured from a few depots and at prices that are almost prohibitive. A simplified and inexpensive technique would be very acceptable.

Muscle trimming is good and should be practised generally, but many of the prevailing methods are cumbersome. Moderate muscle trimming appears to be all that is necessary for most cases.

An outstanding difficulty in full denture prosthesis is the registration of the condyle path because no simple and efficient method of reproducing the condyle inclination on an articulator has been evolved. True, there are many excellent articulators on the market, but their complexity and costliness mitigate against their general use.

The question uppermost in our minds, when articulating dentures, is whether or not it is necessary to work to the individual condyle path. Some authorities claim that when a slight change is made through the alteration of the occlusal curves, a new path will be induced and satisfactory. Others are of the opinion that success in denture prosthesis depends upon strict adherence to the individual condyle path. This individual path we know is difficult to determine because the swing of the mandible is usually different on each side.

Perhaps the most important dictum in full denture prosthesis is that a balanced occlusion is absolutely essential. Conditions similar to traumatic occlusion in natural teeth may also be found in dentures. Lack of a balanced occlusion is the basic cause of failure in denture construction. Poor impression with good articulation often proves more satisfactory than the best impression with poor articulation.

Partial denture construction involves some kind of mechanical retention. Various forms of retention have been devised such as the Roach, Gilmore, Griswold, Morgan, Chayes, the split-pin and tube, the telescoping crown, and many others; all of which give evidence of an earnest attempt at solving the difficulties of partial denture prosthesis, but they all possess some objectionable feature. Either they cause too great a leverage on the tooth to which they are attached or they require much mutilation of tooth structure for their retention.

The ideal attachment is one that will give adequate retention with the least possible mutilation of tooth tissue, and will also guard against the strangulation of the periodontal tissues of the abutment teeth.

The most familiar attachment is the clasp, either cast, wrought, swaged or crib. It has been, and probably will continue to be, the most universally used method of retention for partial dentures.

The cast clasp revolutionized partial denture construction and brought into being many new and important alloys. It was found, however, that frequently these clasps caused an abnormal pressure on the abutments which resulted in their migration. Another objection

to a glove-like fitting clasp is that it causes a gradual disintegration of the enamel areas covered by the closely adapted metal. This may be due, in part, to the rough surface exposed on the inner part of the clasp. Suitable polishing will overcome this roughness or it may be prevented by casting the clasp against artificial stone. We know that the better fitting a band is, the more protection it affords to bacteria, hence the necessity for frequent cleansing of the inner surface of the clasp. Gold or any of its alloys is not sufficiently hard to cut enamel, but the products of bacterial decomposition, similar to that which goes on continuously under the protection of the clasp, will speedily do so.

A mistake is commonly made in expecting the same degree of resiliency in a cast clasp as is obtained from wrought clasps. This is not possible. To obtain the maximum resiliency in cast clasp metal, cool slowly after casting. This has the effect of tempering the metal; cooling quickly anneals it and destroys the resiliency. It is a good plan to allow the metal to cool slowly and then cut away the investment.

The wrought flat clasp also covers a large surface of the enamel, but has the advantage of not being so closely adapted to the tooth, because it comes into close contact with the enamel only at about three points. The greatest usefulness of the wrought clasp is seen in cases involving extremely bell-shaped or malformed teeth.

Many dentists prefer the swaged round wire clasp because it covers the minimum amount of tooth surface, hence affords the least protection for bacteria. A disadvantage is that it does not give the stability of the wrought or cast clasps.

The ideal clasp might be described as one so constructed that the junction between the clasp and denture would permit of a little independent movement and thus break the direct strain upon the tooth, and at the same time cover a minimum of tooth surface.

The seriousness of dental focal infection lessens the value of all attachments that require pulp devitalization, or cause too great a leverage upon the teeth used as abutments. We do not wish to place anything in or around teeth that will cause excessive tooth mutilation or pulp devitalization. It is apparent, therefore, that partial denture construction calls for the highest engineering skill and an intimate knowledge of dental histology and pathology.

Broadly considered, every partial denture should depend upon the ridge for taking up the stress of mastication, and upon the abutment teeth only for retention. The saddles should be so designed as to distribute the stress evenly over the entire area. Cast metallic saddles give good results because of less bulk required as compared with vulcanite, and so afford more space for the tongue. The irritation of the tissues is also less pronounced under metallic surfaces than is the case with vulcanite.

There is no single rule applicable to all cases in partial denture

construction. The successful prosthodontist must be skilled in many methods and be in possession of numerous devices to circumvent unusual difficulties.

PERIODONTOCLASIA.

This department of dentistry has shown remarkable progress and many truly surprising cures have been recorded, such as the regeneration of the alveolar tissue and the physiological attachment of gum tissue to the cementum.

In order to get a correct perspective of this much discussed question concerning the causative factors involved in pyorrhea alveolaris, a brief resume of the progress of dentistry in combatting this disease is desirable.

As early as 1862, Robitzeck of Vienna treated pyorrhea by excising all gum tissue of an abnormal appearance. A straight incision was made through the soft tissues down to the alveolar process. This was followed by a scraping of the alveolar bone.

In 1869, John W. Riggs, of Hartford, Conn., stated that pyorrhea was caused by the irritation of calculi and other accretions upon teeth, contiguous to or beneath the free margin of the gums. Both Riggs and Robitzeck were confirmed localists, in so far as their treatment was concerned.

Eugene S. Talbot was perhaps the first American to take the view that pyorrhea may be due to both local and constitutional sources. He emphasized the possibility of systemic infection and nutritional disturbances of the underlying tissues giving rise to a pathological condition which in turn was aggravated by the deposits of calculus on the teeth.

W. D. Miller, who has been called the father of scientific dentistry, was the first to isolate the staphylococcus aureus, and albus, and the streptococcus pyogenes from pyorrhea pockets. He also described about sixteen other types that he was unable to isolate. Miller believed that pyorrhea was caused by a wide group of organisms in varying combinations and not, in any case, by a specific type of bacteria.

Pyorrhea vaccines were introduced by Kenneth Goadby, of London, Eng., and following this, treatments combining both vaccines and prophylaxis were instituted. In many cases, good results were obtained. About 1916, the vaccine method of treatment was discredited and shown, in some cases, to be positively dangerous.

Then followed a new specific called Emetine. This was founded on the amoeba theory and came into general use. Soon, however, it was demonstrated that surgical methods alone would bring about the same results as Emetine had done, consequently its use gradually diminished.

Succinimide of mercury was next tried. This preparation had

been in use as a specific for venereal diseases and a marked improvement in the condition of the tissues about the teeth had also been noted. It was injected deeply into the gluteal muscles. Little has been heard recently of this method of treatment.

From the foregoing it is readily seen that we have been following hit-and-miss methods in our treatments. It is a confession of the fact that we have been baffled as to the real cause of pyorrhea. This unfortunate condition is due primarily to the unscientific manner in which the profession, as a whole, has studied general pathology, physiology and histology. It is also quite evident that without a thorough ground work in these basic subjects, little real progress can be expected.

To-day a large section of our profession are of the opinion that irritation of some form, usually of a mechanical nature, is one of the most potent factors in the etiology of periodontoclasia, and that traumatic occlusion is chief among the irritants because it causes irritation of the entire pericementum. If continued long enough, it will cause injury to the alveolar process as well. To these dentists, pyorrhea alveolaris is primarily a disease of the investing tissues of the teeth, that is, the gums, the gingiva, the alveolar process, the cementum, and the pericementum.

There is another important section of research workers, who believe that pyorrhea is a constitutional disease, associated with faulty nutrition and systemic intoxication. Some of these men hold that if the local irritants about the teeth are removed, such as those interfering with the health and resistance of the periodontal membrane, and the constitutional disturbance also corrected, then the results will be satisfactory.

As representing those who emphasize the constitutional factors in pyorrhea, we might quote Sir Arbuthnot Lane, a distinguished English authority. He asserts that pyorrhea is caused, mostly, by intestinal stasis. The basal chronic constipation sets up an alimentary toxemia which poisons the whole system, and the oral cavity, which offers a very fruitful soil for growth of infective organisms, soon becomes disorganized. The pus, that forms about the teeth, finds its way into the intestinal tract and a secondary infection sets up. This view is supported by another eminent English authority, Mr. Harry Forsyth, who believes that there is a dependence of pyorrhea alveolaris on intestinal auto-intoxication, produced by chronic intestinal stasis, a vicious circle of infection and re-infection being thus set up.

From the variety of opinions thus expressed we may deduce this: that it is best, when treating pyorrhea, to eliminate from the oral cavity all likely sources of infection by local measures, resorting to extraction where necessary, and at the same time tone up the system

generally, so as to place the patient in a favorable condition to combat the attacks of any gastro-intestinal disturbances.

An urgent need in the treatment of pyorrhea, is early diagnosis. We should not wait until the patient directs attention to it. The seriousness of this disease should be ever appreciated and everything done to check it at its very inception.

It is scarcely necessary here, to comment further upon the subject of pyorrhea because of the fact that provision has been made for the presentation, at these meetings of the Ontario Dental Association, of the complete findings of our research workers. We all await with hopeful anticipation, their reports.

However, with the evidence before us and as we have it up to this time, we are forced to the conclusion that it is not the whole truth to say that in all cases, pyorrhea is a purely local lesion, or that it is a local manifestation of gastro-intestinal disturbances. It may be one, or the other, or even both.

PREVENTIVE DENTISTRY.

The difficulties of root-canal work, of periodontoclasia, of partial and full denture construction, and, indeed, of every department in dentistry serve but to emphasize the importance of preventive measures. Heretofore a grave mistake was made in giving practically all attention to measures of tooth repair and replacement and very little, if any, to the prevention of tooth destruction.

Preventive dentistry, to be truly effective, should start with the child: better still, it should start with the expectant mother, for pre-natal treatment, though but recently recognized, has amply proven its worth.

Mrs. Mellenby, whose work in connection with the teeth and nutrition is so widely known and appreciated, points out that many deciduous teeth which appear perfect to the naked eye, on microscopical examination frequently reveal defective formation of both the enamel and dentine. Over eighty per cent. of deciduous teeth examined, showed imperfect calcification, and of these the great majority were carious. Now, in view of the fact that the deciduous teeth begin to calcify before the birth of the child, it is obvious that preventive dentistry finds its place in the early foetal life of the child.

We know that food has an important relationship to tooth formation, and that a diet deficient in mineral salts, particularly calcium, will detrimentally effect the dentition of both the mother and child. Therefore the need of a suitable diet for the expectant mother should be emphasized at every possible opportunity.

Upon the eruption of the permanent teeth, attention should centre upon the sixth year molars. These teeth should be preserved at any cost. If necessary the deep sulci should be filled with cement so as to prevent the lodgement of food in them. In addition, a suitable diet

should be outlined for the parent's guidance. We all know that dental operations for children are often very trying and unappreciated. When this is the case, think of the words of Philips Brooks:

"He who helps a child, helps humanity with a new distinctness, with an immediateness with which no other help given to human creatures in any stage of their life can compare."

Preventive dentistry must not stop with the child: it must be continued on into adult life, for there is no period of complete immunity from the ravages of dental caries.

A new importance is being given to the saliva: indeed it is becoming apparent that this fluid holds a host of unknown possibilities for dental and other investigators. It should not be looked upon as merely saliva. It is primarily a derivative of the blood and may possess normal or abnormal constituents as does the blood. At least one dental research worker speaks of the possibility of gauging systemic conditions from an analysis of saliva. This then would supplant the customary blood test.

The true character of normal saliva is a subject of much controversy. The prevailing opinion perhaps may be said to be, that saliva normally is alkaline. Acidity, usually, but not always, denotes a pathological state or a deviation from the normal. So many factors enter into this determination that it is practically impossible to formulate a rule.

Some accurate yet simple method of determining the acidity or alkalinity of saliva is needed very much. The usual methods in use are not sufficiently accurate because of the presence of buffer salts in the saliva. Good results we know are obtainable by the hydrogen ion concentration process, but this is too complicated for general use.

Preventive dentistry is making remarkable progress, but much yet remains to be done. With the solution of its many problems we shall be approaching nearer and nearer the true goal of all dentistry, namely: the prevention of tooth destruction.

We should remind our patients of the advisability of regular examination of the teeth so that incipient caries may be detected, because we have learned that the most satisfactory kind of dental restoration is one that does not involve pulp devitalization. Small cavities can be taken care of expeditiously and with the minimum amount of discomfort to the patient. Large cavities involve pulp treatment and the possibility of subsequent discomfort or even infection.

THE OUTLOOK.

The key to the future of dentistry may be found in the records of the past and the outlook is very promising. True, there are many

problems confronting us, but these will be faced fearlessly and their solutions sought after diligently.

The outstanding need in dentistry is for men of broad education. Some think that our educational programme should be directed by the University; others, that it is best to arrange our own courses and acquire help as needed, from the University, without actual affiliation.

To some the solution of our education problems, seems to rest in an alliance with Medicine. It is a fact, however, that Dentistry has already had such an experience and found separation advisable. The first dental colleges were organized because the medical schools would not recognize the needs of Dentistry.

Whether we make an alliance with the University, or Medicine, or remain as we now are, we must ever have uppermost in our minds the necessity of developing the type of dentist to meet the newer demands. Our teachers must work with the firm determination that, in things educational, there is no substitute for honesty. The curriculum must include only those subjects that have a true bearing on dentistry, and every subject listed must be taught, and taught well.

We have been graduating dentists who appreciate, no doubt, the results obtained by scientific methods, but who themselves lack the discipline of scientific training. The effect of this is reflected in much of the research work that has been done. This is exceedingly unfortunate. True research can only be done by minds thoroughly trained in the basic sciences.

There is some measure of truth in the statement that dentistry has not always been on a very sound basis when considered from the standpoint of a practical knowledge of bacteriology, histology and pathology. We have been concerned too much about the superstructure or, let us say, the architecture of our restorations and too little about the foundations thereof. Root-canal work, generally, has not been very successful, Crown and Bridge work has in many cases caused the destruction of the teeth upon which the restorations were supported, and the same may be said of many partial dentures.

The teaching problem in our colleges is a very serious one and is not being given the attention that its importance deserves. Experience has shown that Dentistry must produce its own teachers, yet dentists are rarely equipped for teaching or for research work. It is a fact that those who have received training in the sciences seldom look favorably upon a position on the teaching staff of a dental college. So there is the necessity of importing teachers, many of whom give evidence of being too theoretical and not sufficiently practical, hence the teaching is not effective. Others not being dentists, have not a sympathetic view of dental problems. A good teacher combines wide learning, broad sympathy and a balanced judgment. Such men may be hard to find, but Dentistry must find them if real progress is to be made.

There are many important problems awaiting solution. Since the focal infection theory was introduced we have not had a clear statement as to the disposition of the pulpless tooth, nor have we had an accurate account of the changes in structure, that a tooth undergoes when the pulp is removed. There are also the problems of ionic medication of root canals; pressure anaesthesia; and the true nature of saliva. The questions concerning the acidity or alkalinity of dentifrices; the effect of the various mouth washes on saliva and tissues; the relationship between the decalcification of the teeth and the nutrition; and a host of others of equal importance still remain unsolved.

These are but a few of the questions awaiting solutions; the list is being added to continuously. It is inconceivable that the solutions to them will come from any one mind. We all must share the burden. As Theodore Roosevelt said:

“Every man owes some of his time to the upbuilding of the profession or business to which he belongs.”

If we cannot all take an active part as research workers, we can at least show sympathetic support of those who do. This does not mean the acceptance of every untried theory. Dentistry has already suffered too much from this form of support. On the contrary, we should, at all times, insist upon careful scientific research and ourselves cultivate the habit of critical analysis of every new theory before accepting it. He is acting wisely in regard to innovations in dentistry who follows the advice of the old adage:

“Be not the first by whom the new is tried, nor yet the last to cast the old aside.”

Full Denture Construction for the General Practitioner*

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(Continued from last issue.)

TECHNIQUE OF MIXING PLASTER OF PARIS AND TAKING IMPRESSION.

HAVING made and tested out the tray compound tray in which our finished impression is to be taken it is now placed upon a clean napkin and we are ready to make our mix of plaster of Paris. A clean No. 2 plaster bowl is now half filled with water at approximately body temperature. This temperature easily may be secured by adding either hot or cold water as may be needed, and

stirring with the fingers. To this water is added thirty to thirty-five grains of pulverized potassium sulphate or approximately the amount that can be picked up on a dime. This should be thoroughly dissolved. The point at which it is entirely dissolved may be determined by spinning the water in the plaster bowl, and if there remains any undissolved portion in the form of powder or small lumps, they will pile up or gather in the centre of the bowl where they can be mashed up and readily dissolved.

Another convenient method of making sure of a uniform solution at a uniform temperature, is to take a large five-gallon bottle and fill it to within about three inches of the top with clean water. Dissolve in this water three and one-half pounds of pulverized potassium sulphate. Set this bottle on a small shelf high above the laboratory bench just below the ceiling and put two small glass tubes through the cork. Arrange the tubes so that one will be an air vent and the other a syphon. Some rubber tubing of a convenient length with a pinch-cock clamp at the end completes the syphon tube and makes an excellent method of securing the solution easily.

Next sift into this solution enough Kerr's snow white plaster of Paris to take the impression. A common tea strainer is very convenient for this purpose and about one and one-half tablespoonful is usually sufficient plaster of Paris for the average impression. The plaster of Paris should settle immediately below the surface of the water. If it does not a slight tapping on the edge of the bowl will hasten it. The bowl is now pinched together until the sides almost touch, and the excess water poured off until the plaster of Paris is seen to be starting over the edge of the bowl. An ordinary putty knife with the corners rounded off by a lathe and stone is now used as a spatula and the mass worked out to a smooth even creamy mixture. At this stage it will flow just like so much water or milk. The spatula is now worked slowly back and forth through the mixture to prevent "zoning" or the setting process taking place unevenly throughout the mixture. It will soon be noted that there is a tendency of the plaster of Paris to follow the spatula out of the mix, or in other words it will begin to develop "body."

This indicates that the first of the two stages of the setting process of the plaster is completed, that is, the particles of the calcium sulphate in the process of hydration are dissolved and the newly-formed crystals of hydrated sulphate are beginning to increase in size to form the compact mass of the finished set. The tray compound tray should now be evenly filled and placed in the mouth in the shortest time possible so that the setting process may not be interrupted. However it is just as bad to hurry the work and attempt to take the impression too soon. When the tray compound tray is first filled with this plaster of Paris mix, it will possibly flow freely out of the tray and back into the bowl. It is placed repeatedly back on the tray

with the spatula until it will barely remain where placed. The margins of the tray should be well covered. It is now carried to the patient's mouth and inserted by the usual rotating motion. The heels of the tray are now carefully seated and the anterior portion gradually brought to place with a slight quivering or shaking motion to expel the air and drive all the excess plaster forward and over the turn of the tray compound tray. The cheeks may be slightly raised, especially where the patient may have heavy tense cheek muscles, to aid the soft plaster of Paris in its forward flow, but they should be immediately released. The compound tray is lightly pressed to place until there is a slight rebound which indicates that the thin plaster of Paris has been evenly placed about all the tissues.

The operator now standing directly behind the patient and lightly holding the tray in place with the index finger of each hand, the same light pressure and the same direction of movement is repeated that was used when the impression of tray compound was taken, namely, a light downward and forward movement with the fleshy part of the hand at the base of the thumb against the cheek, gradually bringing the tips of the thumbs together at the median line just below the nose and against the upper lip. The patient is now instructed to bring the lips together in a relaxed position but not to bite against the impression and to incline the head slightly forward. Following these instructions, the fingers supporting the tray are removed from the mouth, the patient obeys, and the plaster of Paris is allowed to set. This whole procedure should be done as quickly as possible so as not to interfere with the setting process of the plaster of Paris. The total time consumed should never be over thirty seconds from the time you start to put the plaster mix in the tray compound tray until the lips are closed over the impression in place. The operator need have no fears about the impression falling from its place. It will stay just where it is placed.

The forcing of the excess plaster forward, the closing of the lips thus forcing nose breathing, and the relaxed tilting of the head forward will all go far toward the elimination of gagging or retching with the majority of patients.

Occasionally a patient will be found in whose throat the tissues are so hypersensitive that it is almost impossible to secure a good impression, due to gagging and nausea. It is important in a case of this kind to use the minimum of material in taking the impression and keep it from extending posteriorly any farther than is absolutely necessary. In such cases it often helps the patient to gargle with fifteen per cent. solution of tannic acid or to paint the soft tissues in the posterior part of the mouth with a two per cent. solution of cocain. Whenever the patient will permit, however, it is better to extend the impression well distally, covering as much of the soft palate as possible, and constructing the base somewhat longer than the

patient probably can wear, afterward trimming it to the proper point at the first sitting.

Some of the leading prosthetists advocate cutting a small hole about four millimeters in diameter in the anterior palatal portion of the tray compound tray to allow the excess of plaster of Paris to escape. The author does not favor this technique for the following reasons. The soft plaster of Paris naturally will follow the lines of least resistance and flow toward the opening. It is better to direct the flow of this excess forward and over the borders of the tray as previously described, thereby completely filling the peripheral turn and securing a better impression of these parts. It is also very difficult by this method, if not wholly impossible, to secure an even compression on the soft plaster of Paris because of the fact that it is not confined.

POST-DAMMING.

The effect of undue pressure upon soft tissue has been discussed at some length in an earlier chapter but at this time a few words regarding post damming might not be out of place.

The post-dam technique and effect was not limited to any one impression technique, but was almost generally used in all techniques and all cases. It has been very definitely proven to the writer, however, that a very small percentage of edentulous cases really require this treatment. Perhaps the ratio would be approximately one in five.

The case in which post-damming is indicated may be described as one having an excess of soft flabby tissue overlying the posterior portion of the hard palate and frequently moving in unison with the soft palate, and having a tendency to break the adaptation. Here the post-dam gives the desired effect. The pressure across the posterior part of the palate against the soft tissue increases the valve seal and materially aids the adaptation. Later when resorption takes place due to this unnatural pressure, the movement of the soft tissues is stopped, due to their becoming thinner, and the denture then fits the mouth as in any other case.

The technique for post-damming is very simple. When the tray compound tray is completed and ready to receive the plaster of Paris mix as described in an earlier chapter, a Kerr modeling compound pencil is heated in an open flame, and the soft compound traced across the posterior part of the tray extending from the buccal surface of the posterior tuberosity on one side, to a like point on the opposite side of the mouth. The Kerr compound after being placed is now heated over a very small flame and quickly dipped into warm water. The tray is then seated in its proper position in the mouth and pressed tightly to place, the pressure being applied in the posterior central portion of the palate directly over the compound post-dam. Steady pressure is maintained until the compound has thoroughly hardened, when it is removed from the mouth and all excess compound trimmed

away. It is sometimes advisable to have the patient suck on the operator's finger while holding the tray in place, or hold the nose tightly closed and ask them to try to blow through it. This will cause the soft palate to be turned sharply down and distinctly mark the point of union with the hard palate.

In cases where a great amount of pressure is required, the compound may be allowed partially to harden before it is placed in the mouth. Black carding wax is sometimes used in the place of compound with good results.

When the plaster impression is taken, the tray is seated with the usual technique already described and after this is done pressure is again applied directly over the post-dam and maintained until the impression is ready to be removed. If when the impression is removed there is found to be a layer of plaster of Paris over the post-dam, it is an indication that enough pressure was not applied to compress against the tissues and the effect of the post-dam has been lost. The plaster of Paris should now be all removed from the tray compound tray, and another impression taken.

REMOVING THE PLASTER OF PARIS IMPRESSION.

The plaster of Paris impression should remain in the mouth approximately two to three minutes. The time varies according to the mix of the plaster of Paris. A good method of testing the plaster of Paris to see if it is ready to remove from the mouth, is to take from the plaster bowl a piece of the original mixture the size of an ordinary soup bean, and by pressing it between the thumb and finger with all the pressure possible, see that it is dry and that no water can be pressed from it. Another method of testing is to press a small piece between the thumb and finger and gradually draw it over the ball of the thumb under pressure. If it crumbles into small dry pieces, the impression is ready to remove from the mouth. If it will form a "smear" on the thumb, then it is not ready to remove. The old test of plaster of Paris, breaking with a clean fracture, is not always reliable.

When the plaster of Paris has thoroughly set, then the lips and cheeks are raised from the borders of the impression and the tip of the index finger is placed upon the soft tissues, just above one of the posterior tuberosities, and while held in this position a turning or rotating motion is made which will loosen the tissues in this region from the impression. The same movement is next made on the opposite side and the same effect produced. The impression is now taken firmly between the thumb and middle finger in the first molar region and a very slight rocking movement produced. The impression will soon be felt to break away from the tissues, and with this same rocking motion continued it is gradually worked downward until it rests on the third and fourth fingers. It is now slowly carried forward

with the thumb and index finger, lifting the lips and cheeks in advance in order to protect the thin plaster of Paris borders from breaking. Upon its removal from the mouth, it is carefully laid in a safe place and the loose plaster of Paris cleaned out of the patient's mouth.

The impression is now carefully inspected to see that the borders are well reproduced and that the black tray compound tray has in no place cut through the softer plaster of Paris and been driven into or against the soft tissues, thereby producing undue pressure or displacement. In case such pressure has occurred the black tray compound is cut or scraped away at this particular point to give the necessary relief, then the plaster of Paris is all removed from the tray compound tray and another impression is taken. It never is advisable to place a new layer of plaster of Paris on the old impression in retaking.

(To be continued.)

Diagnosis for Orthodontic Treatment*

GEO. W. GRIEVE, D.D.S., *Toronto.*

Name and age of patient.

Respiration.—Normal or mouth breather.

Condition of Nose and Throat.—As to presence of adenoids, unhealthy tonsils, obstructions of any kind in nose, etc.

Habits.—Thumb-sucking, lip-biting, tongue-sucking (or holding same between upper and lower incisors), resting chin in various ways against hand, sleeping habits (placing one or both hands under face), biting nails, etc.

Impressions and Casts.—Take impressions in good plaster (French's or Clover Leaf) by the method used by orthodontists, from which make good casts. (For details of taking impressions, assembling and varnishing of same and pouring and trimming of casts, see additional clinics of Dr. Hendry and Mr. Halldorson.)

The Median Line.—Study the face, having the casts on hand, and mark the median line of the face upon the upper cast. Now note if there is any lateral shift of the mandible; if so, have patient shift mandible to true balance with the rest of the face, and note where median line falls upon the lower teeth, and mark same on lower cast; if there is no shift of the mandible, the line upon lower cast will fall directly under that upon the upper.

Classification.—(Angle) Decide as to which class case belongs.

Class I. —Mesio-distal relations of molars, normal.

Class II. —Division—Lower (both sides) distal to normal.

Subdivision—Lower (one side) distal to normal.

*Clinic—Ontario Dental Convention, May, 1924.

Class III.—Division—Upper (both side) mesial to normal.

Subdivision—Upper (one side) mesial to normal.

Class II. cases are usually the result of mouth breathing.

Class III. cases are usually the result of enlarged tonsils; sometimes associated with open bite in anterior region, and possibly mouth breathers.

Overbite.—Normal varies from overlapping of upper incisors over lowers one-tenth to one-third of length of crowns. Excessive overbite usually requires long retention. (See Dr. Fisk's Clinic for detail.)

Radiographs necessary if all permanent teeth have not erupted, or if any pulps are involved. Some teeth may be congenitally absent, or some may be impacted, particularly lower third molars in the older patients. Teeth most frequently absent are the upper laterals, and next in order the lower second premolars (bicuspid). Supernumeraries may be present.

Correct the Cause, not the symptoms only.

Angle of Inclinations of Roots.—In the opinion of the Clinician, 90 per cent. of cases in the mixed and permanent dentures require more or less bodily tooth movement. Those cases requiring this form of treatment will, to a certain degree, be a failure, unless corrected with an appliance which moves the teeth bodily, such as the Pin Appliance or Ribbon Arch. The general practitioner who is not conversant with the root-moving appliances should confine his work in orthodontia to the treatment of those cases requiring only "tipping" of the crowns of the teeth. His ideal field is with those cases in the deciduous denture, where there is lack of development sufficient to accommodate the permanent teeth, and also those where the mesio-distal relations are abnormal, or are developing an excessive overbite. Of course, the parents of those children with habits (and the latter are a legion), should be instructed in the matter of helping the children to overcome the habits, and should also be impressed with the importance of same. These cases should be followed up closely, and all should be treated as early as it is possible to handle the child, commencing at about four years of age.

Mouth Breathers.—Have these children wear Surgeons' Silk Isinglass Plaster over their lips at nights. The plaster should be cut in strips about one-quarter of an inch wide, moistened and placed over the lips in the form of the letter X, the strips being about two to two and a half inches long. Soak plaster well in the morning, and it comes off easily. Teach these children how to become normal breathers.

Muscle Training.—Study the articles (Dental Cosmos during the past five or six years) upon this important subject, by Alfred P. Rogers, and put this information into practice.

Diet and Mastication.—See that patients have balanced diet, and stress thorough mastication. Show them the proper size and design of tooth brush (Hutax). Teach them in the presence of mother, or attendant, the up-to-date method of brushing the teeth.

Important.—Remember that if the “cause” is not corrected, there is little chance of success, and failure may result in the loss, by the dentist, of the confidence of the family.

Study the subject and measure up your limitations. Do not attempt difficult cases; these worry the specialist who gives orthodontia all his time. Look up and study an article upon “The Application of Fixed Appliances in Orthodontia,” by Dr. J. Lowe Young (Dominion Dental Journal—1916 or thereabouts). Also an article, by the same author, on “Reproduction of Normal Tooth Form in Restorations” (Dental Items of Interest, April, 1924). Another article, “A New Gospel and an Appeal for Higher Art in Amalgam Fillings,” by Dr. A. Pond, Rutland, Vermont (Items of Interest, January, 1914).

Success in the treatment of malocclusion, as in many other of the sciences, cannot be attained without careful thought, study, and lots of experience. *None of us will ever know it all.*

Text Book.—The subject of Orthodontia for the general practitioner is very well covered by Dr. Pullen in the most recent issue of “Johnston’s Operative Dentistry.”

All Aboard for the West—Canadian Dental Convention, Vancouver, B.C., August 4th-9th, 1924

ONTARIO Dentists and those from the East are reminded of the Special Convention Excursion by the Canadian National Railway leaving Union Station, Toronto, on Thursday, July 24th, 1924, at 10 o’clock a.m.

Reservations and other information regarding transportation may be secured from Dr. C. A. Kennedy, Physicians and Surgeons Building, Toronto. Information regarding the Convention may be secured from the local committee, Vancouver, or from Dr. S. Bradley, Ottawa, or Dr. E. A. Grant, Secretary, Toronto.

If you have great talents, industry will improve them; if you have but moderate abilities, industry will supply their deficiencies.

—Samuel Smiles.

Common Manifestations of Syphilis in the Mouth*

BY J. COLLINGWOOD STEWART, F.R.C.S.

HE said that syphilis in all its stages was represented in the mouth at some time or other. If he were asked to give a definition of syphilis it would be that it was an infective venereal disease peculiar to human subjects, but inoculable into the higher anthropoid apes. There were three stages. The primary stage was a local manifestation at the seat of inoculation, and four weeks was about the usual time for a primary chancre to make its appearance after inoculation. In the congenital variety there was no primary chancre, which existed only in the acquired varieties. The secondary stage commenced at any time from one month to two years. The usual thing was for the secondaries to commence from six weeks to three months after the primary chancre had been noticed. These were superficial lesions, were symmetrical and highly infective. The tertiary stage came on at any time from the second year onwards; it might even be thirty or forty years. The lesions in the tertiary stage consisted of deep fibrocellular infiltration of skin, bones and viscera. It was important to remember that they were not infective. So far as dentists were concerned, the most important stage of all was the most infective stage, which was the secondary one, but they were liable to meet with all the varieties. Primary chancres were found in the mouth, on the lips, on the tongue, the cheek or the tonsil. The lip chancre was infected from such things as kissing an infected person, smoking an infected pipe, or using drinking utensils, spoons or forks which had been infected. It was usually found on the upper lip, and presented itself as a flat ulcer on an infiltrated base, it was not so parchmety hard as a chancre on the penis. It usually developed on the lip to a much greater extent than on the penis, on account of its rarity and the difficulty of diagnosis, therefore, they were dealing with a much larger chancre and one in which the usual features were missing, they were replaced by others. The large swelling was more concerned with the skin side of the lip than the mucous membrane, and the primary chancre on the lip affected the glands more. With regard to the differential diagnosis, they had to work it out between two main things. The first was epithelioma and the second tubercle. There were definite features about each of them, and the diagnosis ought to be evident. In the first place a chancre came up quickly, it started as a flat papule, speedily enlarged upwards and from side to

*Delivered to the North of England Odontological Society, Feb., 1924.

side and reached a good size within a week or ten days. Epithelioma did not start that way. It started from a pre-cancerous condition and progressed slowly, or they had a definite history with regard to such a thing as the smoking of a clay pipe. It first began as a little swelling nearly always on the mucous membrane and enlarged by direct extension of the edges, the base was not so deep in the lip as a primary chancre (which was actually in the lip substance itself). The epithelioma was actually on the surface and only grew inwards as the growth advanced, and took a considerable time before it invaded the thick tissue of the lip. There were, of course, no secondaries in the case of epithelioma. If a growth on the lip had been there for two or three months and there were no secondaries, they might be certain it was not a chancre but an epithelioma, and they would deal with it accordingly. The chancre on the lip sometimes caused a condition of macro-chælia, which simply meant that the lip was enlarged by the lymphatics becoming invaded and assuming a size larger than the chancre itself. Tubercular disease of the lip was very rare indeed, but the diagnosis was evident because the lip had been infected from the lungs. It was a secondary condition to phthisis, the patient had a cough, and the enlarged lip contained little tubercles that looked like apple jelly. There was also no evidence of new growth, and tubercle was not so hard as a primary chancre or epithelioma, and there was pre-existing phthisis. Tubercle could be on either lip. A primary chancre on the tongue conformed to the same diagnosis as that on the lip, but there were two or three points between it and epithelioma of the tongue that were quite characteristic. A patient with a chancre of the tongue was able to put the tongue straight out and would be able to present the chancre on the tongue quite completely, but with an epithelioma the patient could not put the tongue out. Although a chancre of the tongue was painful, the pain was limited to the actual site of the chancre itself. With epithelioma the pain very frequently extended to the ear on the same side as the epithelioma. On the tongue the primary chancre assumed a rather large size (for the same reasons that it did so on the lip). There was also much infiltration of the base but not much induration. Tubercular disease of the tongue presented shallow ulceration, no infiltration, great pain, and was secondary to pre-existing phthisis. A primary chancre on the tonsil was very rare indeed because it had to be inoculated. A primary chancre was infective, but not to the same degree as the secondary syphilitic lesions were. They must pay great attention to the secondary manifestations of syphilis in the mouth, because they could be comparatively slight and were often the first things that drew attention to the fact that the patient had syphilis. They varied from the slightest simple congestion of the faucial mucous membrane to marked ulceration. The former showed as red patches on the pillars of the fauces, and were usually symmetrical and semi-circular. They started from a point and

increased, making wider circles as they went on. Therefore, the first place to look at was the pillars of the fauces, and if they saw a spreading redness on both sides they could put it down that the secondary stage was commencing. If that particular congestion was not treated at once then symmetrical ulceration followed and spread to the tonsils and along the soft palate to the uvula. The ulcers were shallow with a sharp edge and progressed like a snail track, grey in appearance. These ulcers usually healed without any loss of substance. There were other manifestations in the mouth which were equally important although not so characteristic. These were the so-called mucous patches which were most frequently seen in the mucous lining of the cheeks, in the corners of the mouth, and sometimes, if there were rough teeth, on the side of the tongue. The patches were usually small and on both sides of the mouth. Condylomata were similar to mucous patches, except that they were usually found in places where naturally the skin was damp. When they occurred on the tongue they formed a wart-like mass on the dorsum, which was hard to the touch, but not so hard as epithelioma; it was known as "Hutchinson's ward." At this period the manifestation was often complicated by a stomatitis, due to mercurialism. A short time ago the principal treatment was by mercury. Mercury set up a peculiar mercurial stomatitis in the form of ulcers with a grey sloughy base, spongy bleeding gums, excessive salivation and a foetid mouth. These things coexisted and complicated the diagnosis. These secondary conditions were extremely infective, and it was from these mouth infections that most of the extra genital chancres came. Dentists must not run the risk of infected hands or fingers with these conditions. If they found there was a secondary syphilitic condition in the mouth, unless very urgent treatment was required with regard to the teeth, they should put off the case until the patient was under treatment. The treatment in itself was very rapid. After one dose of the 606 compounds the secondary mouth infections were cleared away, and they could go on without the same danger of infection, although they had to remember that in a secondary syphilitic condition the blood was infective as well as the discharge. If they could put the case off it was better to do so, but if not then the question had been raised as to whether they should go on with their manipulations. If it was necessary to go on, they would not do the patient much harm, because it was a general condition, and it was impossible to re-infect the mouth from a condition which was already general. The tertiary stage was characterised by the formation of gummata. The gumma began as a collection of small round cells round the blood vessels usually in connective tissue although they could be in any structure of the body. They progressed in a peculiar way. The blood vessel became blocked up by obliterative endarteritis and by the pressure of the infiltration. There were very few spirochætes in a gumma. They were found in large quantities in the secondary

and primary sores, but in the tertiary stage they were getting attenuated in number and were very difficult to demonstrate. The blood vessels being slowly strangled by the deposit round them and in them, the centre of the gumma was slowly deprived of its blood, it died and formed a gummy slough which looked like wet wash-leather. The gumma was nearly always painless, and that was important to remember. It could be anywhere in the mouth, but was most commonly in the tongue. It did not cause lymph enlargement and was usually without signs of inflammation; the tongue could be extruded quite easily. A gumma was very slow in healing unless it was treated, and if treated it dissolved very rapidly. The diagnosis could be cleared up by one dose of the 606 compounds. A gumma, although it healed quickly under treatment, left a deep scar and much contraction. Another important manifestation of syphilis in the mouth, and this was possibly the most important of the tertiary conditions, was called chronic superficial glossitis. This condition was much akin to the mucous patches on the cheeks mentioned with regard to the secondary condition, but in this case they were dealing with a small cell infiltration round the blood vessels of the tongue and it was nearly always associated with interstitial glossitis. This was an infiltration of the deeper layers of the muscles and fibrous tissues of the tongue. This condition produced "leucoplakia" or white patches which progressed in definite stages, though two or three of these stages might be seen on the same tongue at once. The first thing that happened was that the papillæ became enlarged and swollen, leading to red hyperæmic patches. These were noticed particularly at the beginning, and the best way to notice them was by pressing blotting paper on to the tongue and drying it, they would find the patches appearing quite definitely. An overgrowth of epithelium followed, and as it increased in thickness it became opaque and horny and white in appearance. Later on the excess of epithelium was shed leaving smooth red patches in which the papillæ were atrophied or absent. The leucoplakia patch was a very well known pre-cancerous condition so that they were dealing with a dangerous condition. The tongue was very dry and hard, and thirst was a marked feature, and tenderness extreme; the patient tolerated hot drinks and strong condiments very badly indeed. Unfortunately, this condition was a very difficult one to treat. If the patch became very marked it had to be excised. They did improve under anti-syphilitic remedies, but were not entirely cured. As a matter of fact, this chronic superficial glossitis was not a purely syphilitic manifestation; it could occur with the irritation of too much smoking, or alcohol, or even rheumatism and gout. Congenital syphilis was a general infection without the primary chancre. The first thing noticed with regard to the mouth was that there was a general stomatitis producing an early loss of the milk teeth and deformity of the permanent teeth. "Hutchinson's teeth," as they knew, were a

manifestation of congenital syphilis. With regard to the mouth itself a common deformity was the high arched palate due to the stunted growth of the nasal bones, and "snuffles." Syphilis also in the tertiary stage affected the bones in a marked degree, and affected the bones of the mouth as well as the bones of the skull. This was caused by the formation of sub-periosteal gummata and the consequent necrosis of the bone. They were all familiar with the worm-eaten appearance of the skull, and the same thing would occur in the jaw and the palate.—*Dental Record*.

The Treatment of Dentine in Deep-seated Cavities*

BY LEWIS J. OSBORN, D.S.O., M.D.S.LIV., L.D.S.ENG.

THIS particular point in operative dentistry has interested me for some time, and I wish very briefly to outline my observations and conclusions.

The greatly increased use of radiography has helped us to follow the results of various operations and treatment, and outside of being of great assistance in diagnosis, one valuable aid is the demonstration of the condition both of the tooth itself and the tissues immediately surrounding, when such condition had not always been exposed either by our diagnosis or the clinical history; it is this latter statement that has impressed upon me the subject of these remarks. May I ask you to focus your attention on one particular condition only. I do not include in my subject cases of exposed or nearly exposed tooth pulps, traumatic or otherwise. I am speaking only of those cases where we have presented to us large and deep cavities in any of the teeth, but particularly in the molars of both mandible and maxilla. To-day such cases should not be frequent, but I am afraid most of us have many to treat, notwithstanding all we may do to educate our patients as to the benefit of early treatment of caries and the necessity of periodical examination.

Clinically these cases are simple. There is no history of any dangerous inflammatory condition of the pulp. As a rule the patient more often becomes aware of the existence of these cavities by the breaking down of the outer wall of enamel than by pain; if the latter is present it is only very slight, due to thermal changes or the presence of sugar or acid, is not in any way persistent, and soon passes away. The preparation of these cavities is also simple; they are opened up

*Read before the Liverpool and District Odontological Society, Jan., 1924.

in the usual way and the carious dentine removed, so that when completed we find a deep cavity which, as far as naked eye appearances go, is free from the presence of infected dentine; and here may I be permitted to stray for a moment from my immediate subject. A word of warning in the use of obtundents, used locally in the cavity as we work, or by infiltration anæsthesia which blocks the nerve supply to the tooth in question. Pulp chambers are not by any means of uniform size and shape; they often present abnormalities. Their presence is not made manifest to the operator under the influence of the above treatment. We get no warning from our patient of the near approach of our excavators to one of these abnormalities of the pulp chamber, and consequently often approach too near or even traumatically expose the pulp at some unexpected point. I do not for one moment wish to condemn the use of such a valuable aid to our work, a boon of the greatest value and assistance to both patient and operator.

Having prepared our cavity—it should be free from caries, in no place dangerously approaching any part of the pulp chamber—we are ready for restoration by means of various materials to our hand. The question of sterilization comes first, and here I think is where the failures sometimes arise. I mentioned purposely the fact that to *naked eye* appearances the dentine composing the walls and floor of the cavity was free from caries, but that does not mean that the dentine is not infected. Microscopically a large percentage of these cases will prove the contrary, more so when we consider our present-day knowledge of the composition of dentine and the ramifications of the vessels and nerve fibrils of the pulp. How best, then, to try and sterilize? There are many methods. To mention the most general—thorough evaporation of water by the application of dry heat, alcohol, various essential oils and the silver nitrate reduction method, followed by the flowing of a non-irritant cement over the floor, and if required the inner walls of the cavity, and the final application of a metal plug of gold or amalgam.

If you have used the infiltration method of obtunding the nerve supply, I suggest it is wise, before lining your cavity with the cement, to place a sedative dressing in the cavity for twenty-four hours at least, then remove and thoroughly examine the cavity for possible points where you have approached too near or caused a traumatic exposure. In nearly every case the after history is satisfactory; the patient reports freedom from any pain or even temporary discomfort. This period of calm lasts for from six months to two or three years, when the patient returns complaining of pain, more or less obscure, not localized, often affecting the other branches of the fifth nerve, is as a rule intermittent; in fact, one may say neuralgic in its character, varies considerably in severity but is rarely very violent. To add to the difficulty of diagnosis there are often several teeth in both maxilla

and mandible heavily filled. Nothing is revealed by minute and careful examination of each tooth; they respond as a rule to the usual tests for vitality. Radiographs give us no direct assistance. If the patient is one who has been under our care for a length of time, and the work our own, providing we keep full and correct clinical cards of all the operations, we may be able to locate the trouble, but not always. On the other hand, if much of the work is not of our doing, matters are more difficult.

We may try local sedatives or anti-irritants, ironization, violet rays. Perhaps there follows a temporary improvement, but the old condition returns, and we have no alternative but to start in and remove the fillings, attacking the filled teeth in the order we think best through what knowledge we have gained by our examination, etc. We may be fortunate enough to hit upon the right tooth at the first attempt, we may not, but eventually we find the offending one, and it presents a cavity as I have described; there is no sign of further caries, the fillings have performed their duty of preservation well, but we find as a rule one of two conditions—what is called for want of a better name secondary dentine, or dentine of repair, or the presence of a pulp stone. Treatment follows the usual lines, and the patient is relieved. * * * *

Royal College of Dental Surgeons of Ontario

ANNUAL PRACTITIONERS' COURSE.

THE Board of Directors of the Royal College of Dental Surgeons will conduct an intensive Practitioners' Course in the College Building, Toronto, from Monday, September 15th to Saturday, September 20th, 1924.

The following subjects will be presented: Anaesthesia and Oral Surgery, Crown and Bridge, Partial Denture, Operative Dentistry, Pathology and Periclasia, Preventive Dentistry, Orthodontia, Full Denture.

A cordial invitation is extended to all ethical practitioners. The course will be complimentary to all Teachers in Dental Colleges; for others the fee will be \$25.00.

Further particulars and time table may be had by addressing the Royal College of Dental Surgeons, 240 College St., Toronto.

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No. 7

EDITORIAL

The Ontario Convention

THAT the 1924 meeting of the Ontario Dental Society in Toronto marked an epoch in the progress of dentistry in that province is a fact that will be conceded by all.

In the matter of attendance—good comradeship—enthusiasm—and educational value, it has most assuredly outstripped even the best of its predecessors.

Two outstanding factors contributed largely to the success of the Convention, viz.: the most complete preparations made for the event by the Board of Governors, along with the splendid series of papers, lectures and clinics given by all who were on the programme.

A successful meeting such as this does not "just happen." In this case it was the natural culmination of long and energetic effort. Before the year 1923 was half spent the Board of Governors was organized into proper committees and already planning the character and extent of this Convention.

Too much praise cannot be given our president Dr. F. J. Conboy, for the splendid leadership he gave during the long and arduous period of preparation. Just how much valuable time Dr. Conboy gratuitously gave to this work will never be known to many outside the central committee. But the splendid results achieved most clearly

demonstrate what can be accomplished by energetic leadership, combined with loyal and well organized support.

Looking at the Convention in full swing, with its 675 registered delegates—its well controlled mass meetings—its numerous clinics—its exhibits—luncheons—dinners and other social functions at the King Edward Hotel and the College building, one was amazed at the completeness and smoothness of this great machine. Again we repeat, such completeness and smoothness didn't "just happen." It meant untold study, planning and execution on the part of these different departments.

Dental education and progress in Ontario has been placed under a deep obligation to the 1924 Convention.

Our guests on this occasion were amongst the most distinguished on the continent, Dr. C. N. Johnston and Dr. Don Galley of Chicago, both by their contributions to the programme and by their genial personalities, very materially added to the success of the gathering.

Two of the literary contributions given to the Convention are worthy of special attention by the profession:—"An Authoritative Report on Dentistry as it is Taught and Practised To-day," by Dr. Thomas Cowling, and "Studies in Periodontal Pathology," by Dr. Harold Keith Box, issued to the members of the Convention in a well illustrated bulletin by the Canadian Dental Research Foundation and the Department of Health of Ontario. These two articles will amply repay the most careful study and consideration on the part of the general practitioner.

The dentists of this province are beginning to appreciate the practical value of such a splendid programme of papers and clinics.

They crowded the Convention Hall almost to capacity and they will do so again in response to such a call.

The 1925 Convention is already looming on the horizon. The newly elected Board of Governors have before them no mean task if they would "keep the pace." But they have been well chosen and will undoubtedly prove themselves more than equal to the task of making the coming Convention "just a little better." R. G. McL.

Thunder Bay Dental Association

THE Thunder Bay Dental Society, at their last meeting, on May 26th, 1924, held their annual election of Officers, at which the following were elected:

President: Dr. F. A. Blatchford, Fort William.

Vice-Pres.: Dr. Stewart Ritchie, Port Arthur.

Sec.-Treas.: Dr. H. Quackenbush, Fort William.

Also a programme committee of Dr. Doyle, Port Arthur, and Dr. D. M. Mitchell, of Fort William, was appointed to draft out the activities for the ensuing year.

ORAL HEALTH

A JOURNAL THAT STANDS FOR THE "OUNCE OF PREVENTION," AS WELL AS THE "POUND OF CURE"

Vol. 14

TORONTO, AUGUST, 1924

No. 8

Official Proceedings of the Convention of the Ontario Dental Association

HELD AT THE KING EDWARD HOTEL, TORONTO.

May 26th, 27th, 28th, 29th, 1924.

MONDAY AFTERNOON, 26TH.

THE afternoon meeting convened at 2 o'clock with Dr. F. J. Conboy, the President, in the Chair.

His Worship, Mayor Hiltz, of Toronto, briefly welcomed the visiting delegates, terming as of prime importance among all conventions, those of such bodies as had to do with public health, foremost amid such bodies being the profession of dentistry.

We are proud, said His Worship, of such men as Drs. Banting and Box. We feel proud that Canada has demonstrated it can make discoveries in science as well as the countries that have had more experience and spent more money in scientific research.

I trust, said His Worship, your stay in Toronto may not only be helpful and an inspiration to you in your work, but I hope it may be pleasant, and that it may have its social side as well. I trust the two or three days you spend here may fill you with inspiration and enthusiasm, and that you may have a pleasant and profitable time together.

At the request of the Chair, Dr. Spence Clappison replied to Mayor Hiltz' words of welcome on behalf of the visiting delegates, as follows:

Mr. President, Mayor Hiltz and Gentlemen:

It gives me a great deal of delight to-day on behalf of the Ontario Dental Association to thank Mayor Hiltz for his address of welcome, and I am sure he is getting more proficient at this every

day. Before the year is out I am sure Mayor Hiltz is going to be more than an expert in welcoming the various Conventions to Toronto.

I wish to thank your Worship on behalf of the Dental Society, and to say it is a great deal of pleasure to come to Toronto because of the fact that we look upon Toronto as the great centre of dentistry. Most of us were educated here, and went out from here to our fields of activity.

It also gives us pleasure to come to Toronto, which has been the centre of greater Dental Clinics, and I can assure Your Worship this movement is spreading all through Ontario, and it had its inception in Toronto.

We are also delighted to come here because we always have a royal welcome in Toronto, and if they would just throw the streets open to the automobiles and assure us, Your Worship, that we could park some place, I can assure you we would be delighted a third time.

We have on former occasions been welcomed here, your Worship, by one whose smiling face has almost been perpetual, and we hope your welcome in future may be just as perpetual as our former welcomes have been.

I thank you on behalf of the Ontario Dental Society.

Dr. J. A. Bothwell, the Secretary and Treasurer of the Association, thereupon assured the delegates that the programme would be followed out as nearly as possible. He expressed his gratitude toward those who had registered early, thus lightening the work of his Committee, and urged upon all members the necessity of early mail registration for future conventions. He then wished all the delegates an enjoyable time.

It was thereupon moved by Dr. Bothwell, seconded by Dr. Harold Clark, "that the programme as printed be the official programme for the Convention."—Carried.

ADDRESS OF HON. DR. FORBES GODFREY,
MINISTER OF HEALTH, PROVINCE OF ONTARIO.

In introducing Dr. Forbes Godfrey to the meeting, the Chairman, Dr. Conboy, paid tribute to the Doctor's work as Minister of Health along the lines in which the Association was interested, and assured the Minister that he would at all times have the active support of all the dentists of the Province of Ontario in his work of promoting health among the general public.

Dr. Forbes Godfrey then addressed the delegation as follows: Mr. President and Gentleman: When our friend here, Dr. Conboy, made the statement after passing the programme for the Convention that I was to give an address, it just goes to show the excellent kind of president you have got. I thought all I had to do to-day—in fact all I would do to-day—was to come here, the same as Mayor

Hiltz, and welcome you on behalf of the Government of the Province of Ontario to the City of Toronto, for, after all, the City of Toronto is only part of the great Province of Ontario, and there are visitors here from every part of the continent, I understand. To all of those, and to all of those who are Canadian born, to others who are not and who are making their living on the soil, I bid them welcome, and assure them they may feel quite safe—the great anxiety is to have our great Canada working for Canadians.

When I reached the door and St. Peter, standing there so quietly, said: "Where is your badge?" I said, "I have not any;" he said: "You can't get in here." And he meant it. "Well," I said, "I have got to go in." "But you can't." In other words, there must be, I suppose, a black sheep in every flock, and he picked me out at once.

Now what your President says is quite correct—I am intensely interested in Preventive Dentistry. His Worship, the Mayor, here, said that he had always supported the Dental Profession; thank the Lord I have only given them very little support because I have only lost one tooth and the rest are fairly good. That is why I believe in Preventive Dentistry. You are a very old profession. I don't think you realize how old. I was in Pompeii about three years ago, in Italy, and would you believe it, I saw there in the Museum, taken from the excavations of that city, before the time of Christ, some first tooth forceps, and three teeth. So I said to myself: "Two thousand years ago they did the same thing as we do today—pull teeth, they did not preserve them." When I started out to practise my profession years ago I bought \$25 worth of instruments and they were mostly tooth forceps, and when I look back and think of the number of perfectly good teeth I sacrificed in my ignorance I sometimes feel ashamed to look at a dentist. I was a medical man, the dentists were few and far between, and unfortunately for the dentists at that time, they did not seem to realize that it was better to preserve than to extract, and any preserving they did do did not stay long preserved.

But the Dental profession in the last fourteen or fifteen years has made wonderfully rapid progress. You have in this great city the centre of medical education, because I place you men in exactly the same category as myself. You are medical men dealing with the specific part of the human body—the most important part I was going to say, because it is the gateway to the system, and when you realize, as I have realized more the last two years than I ever did before, that this Province of Ontario has to make an intensive investigation along the line of Oral Hygiene, and if there is one thing that I have been proud of in anything I may have done or may not have done in my career so far, it is the fact that I am head of the portfolio of Health, the first Minister of Health in the Province of Ontario—I have the most important portfolio in the Province of Ontario, and some of these days I am going to add a Dental annex to it (Applause) and when I

do I am going to see that the man who is placed at the head of that Dental Annex—I made up my mind that it will be something worth while for not only dentists of the City of Toronto, because you know you have a wonderful number of brilliant men located in this city, but in the areas all over this great province of Ontario, in the outlying districts like Haliburton and other districts, where people require most careful consideration. You have your splendid dental clinics here. Places like Hamilton and other metropolitan districts are being speedily looked after, but in the other areas, in the hinterland—these are the areas that I propose to take a special interest in. My first recollection of dentistry down in the town of Lindsay was a pair of artificial dentures.

My view is this, and I guess it is the view of the modern dentist: just stop those artificial teeth; we don't need them. That was the idea of years ago—having the teeth out as quickly as possible.

When after a careful investigation,—although I am not a Dental Surgeon, I know something of pathology—even then I was not satisfied, but after the investigation of the work of a certain dentist here in Toronto, a man who has absolutely no idea of the sense of glory in the ordinary term as applied to himself, but a man who has intensively worked along certain lines, and when that intense investigation was confirmed by a pathologist of the note of Prof. Klotz of the University of Toronto, and when Dr. Anderson corroborated, and when Dr. Stillman said to me that “Dr. Harold Box has made a discovery that is an epoch in dentistry,” what else should I do but believe!

I believe the place to start things is not with the eminent souls of your profession and mine; it takes so long to get those things permeated to the public, that I started with the public, and then you know what has happened. I had a more or less pleasant time for a few weeks, and I enjoyed it and I never answered back. I did not have to, because I believed that the 95 7-8 per cent. of the profession of this province can recognize ability. I knew that I could safely leave that sort of thing in the hands of you gentlemen, and looking at you to-day, I must say I have never seen any more intelligent, alert and better looking crowd of fellows in my life.

I am very pleased to see Dr. Johnson of Chicago. I think Dr. Johnson has conferred a very great honor on the dentists of the Province of Ontario by coming here. He is an outstanding man in his profession, a man of splendid type and a man who will be able to tell you some of the things that you don't know. I hope so, because, remember, there is a standard and morale in the professions of the province—dental, surgical, medical and legal—that is the outstanding feature of the North American continent, and when these gentlemen come from any other section of the continent they have got to be prepared to have 100%, to show us very much in this province of Ontario. It may be that I have the egoism born in every Canadian. I am

proud of the fact, because when you realize what in just the short time of the last three years this city of half a million people has handed up, it is marvellous. And I say to every young dentist today: Take your profession seriously. Work along some line of special investigation, and though you may not achieve any brilliant results, you will have the wonderful knowledge and appreciation of the fact that you are doing your duty as a Canadian and you are following such men as Dr. Banting and Dr. Box, who are an honor to the most splendid professions in the world, the professions of Preventive Dentistry and Preventive Medicine.

DISCUSSION—DR. R. G. McLAUGHLIN.

Dr. R. G. McLaughlin, on behalf of the Association, then replied to Dr. Godfrey, as follows: I think we all agree with this, that the appearance of Dr. Godfrey before this assembly of dentists of Ontario today in connection, also, with the statement he has made, is an "epoch event" in the history of dentistry of the Province of Ontario. We have been looking forward—the dentists of Ontario—for a good many years to just what has taken place in the Parliament Buildings of Ontario during the last few months, that is to the appointment of a Minister of Health. Now we have realized that ambition of ours, after a great many years of earnest effort, and we are glad of this, that the Government saw fit to appoint a broad-minded man like Dr. Godfrey (Applause).

I was very glad the first time I had the pleasure of hearing Dr. Godfrey on the public platform, to know, as you were, the very broad-minded, liberal way in which he treated the whole subject. He has realized before this the importance that dentistry has played, and the greater importance that dentistry will play in the public health of the province. I am safe in saying this: that the profession of Dentistry and the Public Health of the Province of Ontario, as far as dental services can make it, are perfectly safe in the hands of our friend, Dr. Godfrey. He has the right idea, and he has the practical ability to put that into force.

I know Dr. Godfrey could have said things a good deal more definite today than he did say; but I am asking you men to keep your eyes and ears open in future, and I think Dr. Godfrey in his future dealing will more than bear out the preliminary statements that he has made today.

On your behalf, may I thank Dr. Godfrey for his appearance here, one of his first public appearances, before the dentists, and for the stand he has taken as a friend of the Dentists and as a friend of the public, and I think I am quite safe in saying this, that while Dr. Godfrey is Minister of Health in the Province of Ontario, if he gives out the ideas that are in his mind, that many a young boy and young girl in our schools today will in future grow up to be a real productive

asset to the Province of Ontario who would likely otherwise have been a liability to the Province.

Dr. Godfrey, we appreciate your coming here today; we appreciate the very broad-minded way in which you have treated the subject and we feel we have in you a real friend to the Dental Profession.

Dr. J. A. Bothwell then took the chair while Dr. F. J. Conboy, the President of the Association, delivered his Presidential address.*

It was moved by Dr. Clarke, seconded by Dr. Ziegler, "that the President's Address be placed in the Minutes."—Carried.

Dr. Conboy then resumed the Chair, and announced the personnel of the Nominating Committee, as follows: Dr. E. P. Moore, Hamilton; Dr. Winnett, Kingston; Dr. Sprott, Barrie; Dr. O'Flynn, St. Catharines; Dr. Ed. Grant, Toronto.

TUESDAY AFTERNOON'S PROCEEDINGS.

May 27th, 1924.

Dr. R. G. McLaughlin occupied the Chair during the meeting of the Dentist's Legal Protective Association, which took place immediately following the luncheon in honor of Dr. C. N. Johnson, Chicago.

LEGAL PROTECTIVE ASSOCIATION.

In opening the meeting of the Legal Protective Association, the Chairman announced that this was the first meeting of the Association and the report which was being presented was the report of the Committee which had been carrying on for the first six months of the year. That Committee was composed of the following: Drs. Harold Clark, A. D. Mason, Wallace Seccombe, W. G. Thompson, R. G. McLean, R. G. McLaughlin (Chairman); W. E. Willmott, (Secretary-Treasurer).

The Chairman then gave the Committee's report as follows:

At the last meeting of the Ontario Dental Association held one year ago the "Advisory Committee" was authorized to approach the Board of Directors of the R.C.D.S. and ask its co-operation in organizing in Ontario an association for the purpose of advising and defending the members of the dental profession, against unjust and frivolous charges of malpractice, or any cases affecting the honor and reputation of the dentist.

The Board of Directors when approached on this matter readily expressed approval of such an organization, and promised its co-operation, as far as it could legally do so. A member of the Board, Dr. W. G. Thompson, was appointed on the committee as representing the Board. This augmented committee was given the full sanction of the Board to proceed with the organization.

*Published in Oral Health, issue of July, 1924.

The Committee at once proceeded to organize the Protective Association along the lines proposed to the Convention a year ago.

In the month of October, 1923, a circular letter was mailed to every dentist in Ontario, concisely explaining the objects and legal scope of the organization, and requesting those who wished to take advantage of such protection, to sign and return an enclosed membership card with the annual fee of \$3.00.

The response to that letter was highly satisfactory. A total of 462 dentists registered and these formed the membership for the first year.

The Council completed the formation of a definite constitution with by-laws, and after submitting it to legal counsel for revision sent a copy to every dentist in Ontario.

The active operations of the Association commenced November 1st, 1923, and the first year will thus end October 31st, 1924.

Dr. W. E. Willmott, secretary of the Board of Directors, consented to act as secretary-treasurer of the Association. Dr. Willmott will thus be able to send out the Annual notice for the fees of the Association at the same time as the College notices are mailed.

The members of the Executive Committee are happy to report that the results of the Association's operations for the first six months are most satisfactory.

During that period the Committee has dealt with some 15 cases of a more or less serious nature, and out of these 15 so far not one case has had to be defended in the Courts by the Council.

The legal counsel agreed upon and appointed by the committee is I. F. Hellmuth, K.C., of Toronto.

So far we feel the association has fully justified its existence. In the more serious of the unreasonable cases that were threatened, when the would-be litigants found they were face to face with a fully organized defence conducted by the legal counsel above named, they thought more seriously of the matter.

The protection of the good name and reputation of the dentist is of such vital importance, that we are convinced every practitioner in Ontario should be a member of this Protective Association.

The fee is very small, being only \$3.00 per year. The larger the membership the better service the Association will be able to render the profession.

Those who are not members may be enrolled at the regular registration office, by signing the membership card and paying the fee of \$3.00

In adopting this report the members of the Association are asked:

- (1) To grant your approval of the general plan of organization and the method of "carrying on" as adopted by the committee to the date of this report.

- (2) That the constitution as printed and mailed to the members be approved.
- (3) That the appointment of Mr. I. F. Hellmuth, K.C., as General Counsel of the Association be endorsed.
- (4) That you appoint the officers and executive committee for the coming year as called for in the Constitution.

All of which is respectfully submitted.

Apropos the moral effect on would-be litigants when they found they were face to face with a fully organized defence, Dr. McLaughlin remarked: That is just where the work of the Association comes in. The great merit of the Association will be found in this organized defence and the retaining of the proper legal counsel, so that those who put forward a frivolous case or an unreasonable case will think two or three times before they throw the matter into the Court. So far it has succeeded even beyond our expectation. Be it understood, however, that the Council has at all times striven to play fair with the public; when we find that a practitioner is at fault we tell him so, plainly, and advise him to make a proper settlement with the complainant. That has been our policy.

Concluding, Dr. McLaughlin remarked: I want to say this before sitting down,—that I wish to pay tribute to the splendid support that the members of the Committee gave the president during the past six months and before that, in organizing and helping with their advice all the way through, in many of these trying cases, and I am sure the other members of the Committee will bear me out if I say in one case the representative of the Board, Dr. Thompson, rendered very valuable service in having one serious case settled out of Court. The Council has been willing and will be willing to go to any pains, to assist members of the Association in any difficulty they may find themselves in.

I have much pleasure, after Dr. Willmott presents his report, in moving the adoption of the whole report.

Dr. Willmott then gave the financial statement as follows:

Receipts:

Fees from 460 members	\$1,389.00
Bank interest	2.14

Disbursements:

Bank Exchange	\$4.20
Receipt Books	10.19
Cash Book	2.50
Two Notices and Cards re Organizing	44.73
Constitutions	33.44
Postage, Telephone, etc.	19.04
Leaving Cash on hand and in bank	1,277.04

\$1,391.14	\$1,391.14
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Audited by the College Auditors.

Dr. Willmott seconded the adoption of the whole report.

Upon question, Dr. Willmott said they had not yet received the account of the Counsel who went over the Constitution nor had they received the bill for the call of this meeting.

Motion for adoption of the Report was then put to the Meeting and was carried.

It was then moved by Dr. Willmott, seconded by Dr. Allan, that there be inserted in By-law No. 1, section B, as mailed out to the profession, the following clause:

“And one member to be appointed by the Board of Directors.” And with this amendment it was moved that the By-laws and Constitution as mailed be accepted by this meeting.—Carried.

It was then moved by Dr. Moore, seconded by Dr. Devitt,

That the same officers and the same Counsel be re-appointed.—Carried.

Chairman thanked the meeting on behalf of the Committee, assuring them the Committee would do its best in carrying on during the next year.

Attention was here drawn by a member that according to the Constitution one man steps out of the Board of Directors each year.

Chairman informed the meeting that Dr. Thompson had been the appointee of the Board of Directors, and whether he would again be or not, he could not say, but at any rate it could be left to the Board of Directors to make the appointment which the Constitution authorized them to make, this being apparently satisfactory to the meeting.

Dr. Harold Clark: The presentation of this report has only taken a few moments, and only those active in it can know how much work it involves. The largest part of the work has been done by our Secretary, Dr. Willmott.

Dr. Clark then moved that in recognition of the services of Dr. Willmott throughout the year, an honorarium of \$100 be given to him. Seconded by Dr. Trotter. Carried unanimously.

Dr. Willmott acknowledged, saying the President had spent quite as much time on it as he had, though perhaps not so much at night.

This finished the business of the Dentists' Legal Protective Association, and the meeting of the Ontario Dental Association once more went into regular session, Dr. F. J. Conboy resuming the Chair.

REPORT OF ORAL HYGIENE COMMITTEE.

It was moved by Dr. Dunlop, seconded by Dr. Harold Clark, “that the report of the Hygiene Committee as printed be received and adopted by this Association.”—Carried.

REPORT OF NOMINATING COMMITTEE.

The report of the Nominating Committee was then given by Dr. R. J. Sprott, as follows:

To the President and Members, Ontario Dental Association.
Gentlemen:

Your Nominating Committee beg to nominate the following to the various offices and standing committees as called for in the constitution: Hon. Pres., F. J. Conboy; President, Col. W. G. Thompson; Vice-Pres., J. C. Devitt; Archivist, C. A. Kennedy; Sec.-Treas., J. A. Bothwell.

Board of Governors: T. F. Campbell of Galt, A. W. Ellis of Toronto, (in place of E. L. Gausby, C. E. Brooks, retiring), and A. W. Winnett of Kingston, in place of J. C. Devitt.

Oral Hygiene Committee:—F. J. Conboy, H. E. Eaton, A. W. Ellis, F. C. Husband, J. C. Livett.

Advisory Committee:—R. G. McLaughlin, Harold Clark, A. D. A. Mason, R. G. McLean, Wallace Secombe.

Respectfully submitted,

(Signed) R. J. SPROTT,

Chairman Nominating Committee.

Dr. Sprott moved the adoption of the report, which was seconded by Dr. E. A. Grant.

The Chairman then declared the meeting open for further nominations.

Dr. Campbell of Galt begged leave to retire because of the distance he was located from the city, but the Chairman did not accept the resignation, assuring the Doctor he would not be called upon to come to Toronto too frequently and the Association wished to retain the benefit of his services.

There being no further nominations, the report of the Nominating Committee was then put to the meeting and carried.

It was moved by Dr. Shantz, seconded by Dr. D. Loughheed, "that the matter of election of officers be referred to the Nominating Committee."—Carried.

Dr. Amy, Superintendent of Clinics, then made various announcements.

Chairman thereupon called upon Thos. Cowling, B.A., D.D.S., for his address: "An authoritative report on Dentistry as it is taught and practised today."*

The Chairman expressed the deep appreciation of the Convention to Dr. Cowling for his very comprehensive paper, whereupon the meeting adjourned for the afternoon.

*Published in Oral Health, issue of July, 1924.

LUNCHEON PROGRAMME.

May 28th.

Dr. F. J. Conboy, the President of the Association, presided. After thanking the delegates for the grand spirit of co-operation exhibited throughout the programme, Dr. Conboy continued: We meet here as men of different political views. But when we gather together in annual convention we are all members of one great and grand profession, having as its object the welfare and betterment of mankind.

I want to thank you, Ladies and Gentlemen, for your support and co-operation, and I want to express the hope that you have been well interested, well instructed and well entertained while in attendance at this Convention.

REPORT OF CANADIAN DENTAL HYGIENE COUNCIL.

Dr. W. Cecil Trotter, Chairman Organizing Executive of the Dental Hygiene Council, was then asked to report for that body, which he did as follows:

In order to correct some of the erroneous ideas that are circulating regarding the newly formed Canadian Dental Hygiene Council and its relation to the C.O.P.A., I am going to start off this report with a short history of the evolution of the idea which led to the organization of this Council.

In the past, public dental educational work, largely carried on by local Oral Hygiene Committees scattered throughout the Dominion has lacked the four C's—Cash, Continuity, Co-ordination and Control.

The organization of the C.O.P.A. largely overcame these deficiencies and has certainly shown more real results and been of greater service to the dentists scattered throughout Canada than any organization in the past.

Even it has been unable to escape the ever ready tendency to criticism which unfortunately is not always of a constructive nature.

Because it secured the wherewithal for carrying on its work from royalties received from the sale of Hutax products the C.O.P.A. was accused of commercialism in certain quarters.

Though the C.O.P.A. did everything within its power to divorce its Educational work from its commercial work and even offered to hand the business-end to another concern, this still failed to satisfy these critics.

Rather than be the cause of any dissension among the profession, however little it might be, the C.O.P.A. offered to comply with any suggestion which would remove criticism and dissension providing it assured the continuance of educational work throughout Canada on a scale at least equal to what the C.O.P.A. had been doing. About

a dozen Toronto dentists of various opinions met together several times in an honest endeavor to work out a solution of these difficulties.

The final suggestion which was adopted was, that a Canadian Dental Hygiene Council with a Dominion charter be organized. This Council to be constituted similarly to the Canadian Mental Hygiene Council and the Canadian Social Hygiene Council and to be made up of public spirited citizens, dentists and physicians, interested in public welfare work and financed by government grants and public subscriptions. The work of organizing this council has now been energetically going on for several months with the result that a very broad Dominion charter has been secured from the Federal Government, and many prominent personages have already become associated with it. The present composition of the council is as follows:

Patron:—His Excellency, General the Right Hon. Lord Byng of Vimy, Governor General of Canada.

President:—General, the Hon. S. C. Mewburn, K.C., of Hamilton, Ontario.

Hon. Pres.:—Hon. H. S. Beland, Canadian Minister of Health, Ottawa, Ont.

Vice-Pres.:—Mr. E. E. Reid, B.A., Manager London Life Ins. Co., London, Ont.

Hon. Vice-Presidents:—The Ministers of Health of the various Provinces.

Representatives on Council:

Dr. Nasmith of the Canadian Red Cross Association.

Mr. J. E. Atkinson, Manager Toronto Daily Star.

The President and Secretary of the Canadian Dental Association.

Provision has been made for the Canadian Dental Association to appoint nine representatives, one from each of the nine Provinces.

Provision has also been made for the provincial dental associations to be represented. It is the intention of the Council to co-operate with the various local Hygiene Committees and to assist them in any work they may undertake.

The object of the Council will be to organize, direct and finance dental educational work throughout Canada.

The Council hopes to have the moral and financial support of every dentist in Canada and the active support of as many as possible. When men like Gen. Mewburn, Mr. E. E. Reid and others are willing to sacrifice their time and interests for the benefit of this council and its work, surely it behooves every dentist to co-operate by giving their heartiest support in every way to this worthy cause.

It is expected that as soon as the Council is completely organized, financed and functioning, there will no longer be any necessity for the C.O.P.A. to carry on educational work, and the Council then

expects to secure the services of Dr. Harry S. Thomson to act as its field officer to promote and direct educational campaigns throughout Canada. The organizing committee of the Council are: Drs. Trotter, Seccombe, Eaton, Conboy, Grant, Broughton and Mason.

I sincerely believe that the principles upon which this Council is organized are ideal, and with the united support of the dental profession should prove to be the most efficient and satisfactory means of carrying on dental educational work throughout the Dominion which has yet been devised.

CANADIAN DENTAL CONVENTION.

Dr. C. A. Kennedy then reported in connection with the Convention of the Canadian Dental Association as follows: The Convention will take place in Vancouver in August this summer. They have asked me to take charge of transportation from Toronto. We are endeavoring to secure enough passengers for a special train. We have enough now for three coaches and if two more could be gotten we could have a special train.

The entertainment at Vancouver will be as good and better than that provided previously, and I understand that previous entertainments that they have put on at Vancouver have been worth going there for.

Dr. Kennedy then gave a synopsis of the trip and the stay of the delegation at Vancouver.

The Chairman, Dr. Conboy, thereupon introduced the Luncheon Speaker, Rt. Rev. Bishop DuMoulin of Detroit, who received an enthusiastic ovation from the delegation.

AFTERNOON SESSION.

May 28th, 1924.

The afternoon session convened in the Crystal Ball Room of the King Edward Hotel, about 2.30, Dr. F. J. Conboy again occupying the Chair.

Donald M. Gallie, D.D.S., F.A.C.D., Chicago, was the first speaker called upon, and he addressed the delegation on "The Building of a Successful Ethical Practice," as follows:

The Building of a Successful Ethical Practice

DONALD M. GALLIE, D.D.S., F.A.C.D., CHICAGO.

We are frequently reminded that the dentist, like the surgeon, is of lowly origin. It is interesting to turn back the pages of dental history in the new world and study the character of men, and the work done in the early years. It would appear as though the first dentists we know much about were men who had some claim to the term professional men. Isaac Greenwood, first recorded as a practising

dentist back in 1750, came of good English stock. His father was a professor in Harvard University, and later, pastor of Old North Church, Boston. It seems that Isaac inherited much of his father's cultural qualities, and it is natural to suppose that he had great faith in the future of dentistry, for of five sons, four were instructed in the art of dentistry. The oldest son, John, achieved special distinction as a skilful dentist and a gentleman of his time. In his day his principal claim to fame was as dentist to His Excellency, George Washington. He is best remembered by the profession as the preceptor of Horace H. Hayden, one of the real founders of modern dentistry. It is reasonable to assume that Hayden's splendid career could, in a measure, be traceable to the example set by Greenwood. Other men of Greenwood's time were men of high professional ideals.

LeMaire, the skilful and cultured Frenchman, was the sort of man to encourage and inspire the men of his day to take up dentistry. His most promising and afterward his most famous pupil was Josiah Flagg, the first native son to practise. Josiah believed in advertising. It is amusing to read his claim of skill in transplanting teeth, curing ulcers, drawing without pain, mending teeth with gold foil, sewing up harelips and correcting pronunciation. He sold by the wholesale and retail everything from dentrifices to chew-sticks and tooth brushes. His advertisements make the modern advertising dentists look like "pikers." However, we must remember in those early days it was necessary to let the public know what dentistry meant. Flagg was an exceedingly skilful man and a gentleman in all the word implies. The professional and social success of these pioneers attracted many unscrupulous men who had no professional understandings, or ideals, possessed little or no skill. They were charlatans, not artisans.

The result was that for some years dentistry was in bad repute. Then came the great revival through the efforts of Hayden and Harris, the founding of the first dental college, the publishing of the first magazine, and the organization of the first dental society, all within eighteen months, and all co-ordinating. This gave us the right to claim the status of a profession.

What strides have we made in the art, if not the science of dentistry? We became skilful craftsmen, we became masters of reparative procedures, but in spite of our superior technic we continued to fall hopelessly behind in combating caries. In recent years we have come to realize that we must not only advance in the art of repair, but strive unceasingly to master the science of prevention. To this end we have raised the standard of matriculation repeatedly, that we may have a class of men fundamentally prepared to understand the sciences.

In my time I have seen the advance from graduation from grammar school to the one year predental course in most colleges and a two years' course in a few. I have seen the college course advance from

two years of six months to four years of thirty-two weeks. I have had a good chance to study the annual output of the past thirty-three years, twenty-nine years in college work and four years as member of the State Board. Were you to ask me what improvement I have observed in the technique and scientific understanding of each succeeding class, I can only say splendid; were you to ask me my opinion of the professional and ethical standards of the recent years, I say encouraging, although I confess higher education has not entirely eliminated the man of unethical tendencies. He may not be the crude type of years ago, with the large signs and extravagant claims of skill; instead we have the more subtle and dangerous type, who capitalize the fears of their patients, who are more concerned in *selling operations* and splitting fees than they are in rendering true professional service. You cannot depend on education entirely to build the foundation for a professional man. You must look to the man. "As a man thinketh in his heart so is he."

As far as we can look back we associate the question of ethics most intimately with the professions. Why should we not have the same standard of honesty and integrity or Code of Ethics govern all callings? What is meant by ethics or ethical practice? According to the best authorities it means treating of or relating to manners and morals.

Matthew Arnold "Literature and Dogma" says, "Ethical means practical; it relates to practice or conduct passing into habit or disposition." This definition would certainly make the application of the term very elastic; individuals or organizations could stretch it to embrace most anything.

The world at large demands a stricter code for the dentist and doctor because they say we safeguard the health and lives of those we serve; that is true. Think of the many businesses that are supposed to safeguard health and lives and look at the infractions. Take the manufacture of foodstuffs. Until the rigid enforcement of the pure food law, there was hardly a manufacturer of food products who did not adulterate or substitute health-destroying or death-producing ingredients. Think of the crime and the tragedies as a result of war profiteering, by men who had a high position in the business and social world and who were expected to safeguard the health and lives of the brave lads who answered the call! Look at the disclosure of crooked government officials, enough to wreck our very foundation, and shatter the faith of our people! At this time, when the whole world seems to be suffering from moral collapse there should be a renewal of faith in the greatest code of ethics—the Golden Rule.

In considering the question of how to build a successful ethical practice, we must start at the beginning of a man's professional career. First, what kind of preparation has he undergone? Has his Alma Mater prepared him scientifically, technically, and ethically for his

life work? The blame for all a man's shortcomings is laid at the door of the college by some men who think they know more about running a dental college than men who have made it their life work, and who have made tremendous sacrifices by so doing. The advancement in dental education has kept well abreast of the other professions. The sciences in all Class A colleges and in many Class B are taught by all time men, graduates of the best universities and masters of their subjects.

In the college I am connected with, our students have the same science teachers as the medical students. No allowance is made the dental student; he takes the same histology, bacteriology, physiology, histo-pathology and chemistry as the medical. One of the most important assignments for our students, are his days in the examination room under the skilful guidance of a capable diagnostician. He is required to make his examination, report his findings, and in many cases write up the case history. One of the greatest advances in dental education is the seminar courses, and the requiring of students to write frequently on different subjects. This makes him read and study, and soon develops a taste for writing.

I think you will agree with me that the outstanding weakness of the dentist of today in his indifference and inability to write. The teaching of the practical branches has reached the highest point of excellence. The heads of the practical departments in most of our colleges are men of national, yes international reputation. They have gathered around them a corps of instructors and demonstrators that are accomplishing wonders. I wish every one of you who have been out of college some years would make a pilgrimage to your Alma Mater and see the improvements in teaching methods, and the development of technical skill. You would come to the conclusion that the new graduate, if locating in your town or near you in the city, would be a competitor worthy of your respect.

During the past few years it has been my privilege to visit nearly all of the more important dental schools in the country. What I know and what I have seen warrants me in making this statement. The average senior student is doing better root canal work, prophylaxis, crown and bridgework, gold inlays and amalgam fillings than the average practitioner today. I firmly believe that the new recruit is fundamentally and technically fitted for his lifework without fear of failure. The inspiring of a young man with the ideals necessary for a true professional man is a difficult problem for the college. You cannot remake a man in four years.

This ethical question is not as complex in Ontario as it is with us on our side of the line. There are few dental colleges in the world that enrol as high a standard of matriculants as you do in Ontario. They come from good stock, mostly English, Scotch and Irish. The

day of the preceptor is over; they have learned nothing you must undo; they come to you from the university, the school-room where they have been teachers, or from positions that required educated men. After matriculation you are all the product of one Alma Mater. I understand that practically one hundred per cent. of the dentists of Ontario are graduates of the Royal College of Dental Surgeons. You have received your instruction from the same faculty, you older ones from the grand old men of Canadian dentistry, Dr. J. Branston Wilmott, Luke Teskey and W. T. Stuart, the younger ones from Webster, Seccombe, Willmott, Box and their associates. You have had in your ranks leaders that stand for the highest ideals, men like Harry Abbott, Dr. Chittenden, Dr. Nathaniel Pearson, George Caesar and your own and our own C. N. Johnson. Surely the lives and work of these men should be a standard for the men of to-day and the men of tomorrow.

What a different problem we have! The product of fifty colleges, in the past, some good, bad and indifferent. Today mostly good. We have the horde of foreigners, and they are mostly bad or tricky, who come with all kinds of "phoney" credentials, certificates and diplomas, and who get by some State Boards, and then in time to other states, through reciprocity. The wonder is that we have not more of the unethical. Thirty-three years association with dental students, and the close relationship that develops between many of them and the heads of the practical departments, has given me an opportunity of keeping in touch with a great number. They write me about their successes and disappointments. When I meet them at dental gatherings, they relate their experiences, and it is interesting to learn the attitude of the established practitioner toward the new man. It is gratifying to state that the great majority are received into full fellowship, but occasionally the new man is looked upon as an interloper and receives scant encouragement. What an uphill fight for a beginner! Is it any wonder if he is tempted to resort to unethical means to get a start? How much more likely that boy is to start right and continue to go right if the established man would make him feel welcome and on an equality.

The building of a professional business differs materially from that of commercial, mercantile or industrial. The personal equation enters so intimately into a professional career, so naturally personality is one of the big factors in building up a practice. In the April number of the American Magazine, the leading article has created considerable comment. It is entitled "Personality, its Twenty Factors and How You Can Develop Them." It is an interview with Dr. Werrett Wallace Charters, a Canadian and head of the Bureau of Research, University of Pittsburgh. I take the liberty of using a few of the twenty factors that I think fittingly apply to the dentist:

Ambition: Have you the real will to improve yourself, not merely a vague intermittent desire?

Industriousness: Have you the ability to drive yourself steadily? Do you faithfully perform tasks that are distasteful?

Forcefulness: Do you give people the impression that you are capable and self-controlled; are you self-reliant?

Friendliness and Cheerfulness: Do you depress people? Or are you a cheerful companion? Nothing is more contagious than cheerfulness. A cheerful dentist creates a cheerful atmosphere. Yet I know some dentists who say friendliness and cheer interfere with professional dignity.

Neatness: Is there any calling that demands a higher degree of neatness than the dentist? Clean in body and mind; neat in attire, office in good taste, and tidy; instruments and equipment in order. When you think of the lack of these in so many offices, you wonder how they ever get a refined cultured patient.

Effectiveness of Speech: This factor is essential in and out of office. I know a legion of men who outside of the knowledge of their business are regular dumb-bells; they are hopelessly lost in conversation, and discussion of current events and world affairs, or the literature of the day, and how easy it is to obtain this knowledge. The splendid weekly and monthly magazines are teeming with up to the minute information; the great dailies have either foreign correspondents or associated press facilities that keep us posted on international affairs, and the weekly book review in the press keeps us acquainted with the best literature. What an advantage the well read and posted man has in society compared with the fellow who is only familiar with the scandals of the day or who can give you the batting average of the ball teams! Which is likely to attract the class of patients that are pleasing and profitable? I have known many men of impressive personality, but mediocre ability as dentists, who have been very successful, but it does not follow that this is general. Above everything else a man must have skill and judgment if he expects to enjoy a full measure of success. I do not mean that he must be a technical wizard, simply of good average ability. A few, no matter how diligently they strive, will never rise above the ordinary; nevertheless the great rank and file can, with the facilities at hand, become skilful, even expert in some, if not all, branches of dentistry. Our colleagues of the medical profession in the past have enjoyed advantages that were denied us. When they felt the need of up-to-date medical knowledge, or surgical technique, they could go to the many postgraduate schools in this country or in Britain and Europe. It is only in recent years that we could get anything like real postgraduate work in our colleges. I happened to be in Toronto last fall on the opening day of the postgraduate course in the Royal College, and the splendid

attendance and the calibre of men I saw testified that the dentists of Ontario were alive to the need and benefits of such a course.

The organization of study clubs and clinic units throughout the country has been the greatest boon for better service and improved practice, before dental societies took up this work, and I regret to say they deferred it too long. A few experts in different specialties formed classes in different large cities and gave excellent instruction, the classes running from one to two weeks. Noting the success of these classes a number of dental adventurers formed classes for every conceivable procedure, from how to soak a patient to alveolectomy, at a charge of fifty to one hundred dollars a man. Some of these courses consisted of a day's instruction; thank goodness their day is about over! I consider the Province of Ontario a very favorable field for this type of postgraduate work. Your large towns and cities are well distributed. The dentists within a radius of miles could conveniently meet in these centres. In sections not in close proximity to the large cities, clubs and units could be formed by one, two or three counties. With the improved roads, interurban service, your Rolls-Royce or flivver, it is easy to reach any point during many months of the year.

The study club and clinic unit is especially valuable to the rural practitioner, not that the country dentist is not as skilful as his city brother, but because he must be a better all-around man. The city dentists' mistakes are lost sight of in the many activities of city life; the mistakes of the country dentist are advertised to the whole community. The city man has the advantage of consulting with specialists or skilful friend if some procedure baffles him; the country dentist has to work out his own problems. Take as an illustration, denture construction, partial and full, which plays such an important part in the success and failure of a dentist, especially the country dentist. I know of no branch of dentistry that has made greater advancement than impression taking and denture construction, and the man who masters this new technique will soon establish a reputation that will overshadow the competitor who is too busy to attend dental meetings or join study clubs. The laity will soon learn of your efforts to keep up with the times, and you will be rewarded by their confidence and patronage.

When Black first presented his work on cavity preparation and his principles of extension for prevention, the dentists of the east damned it with faint praise. Many were hostile, but out in the middle west a little band of earnest men met and organized Black Study Clubs in the States of Wisconsin, Minnesota, Iowa, Nebraska and a part of Illinois. The members of these clubs met for a day and evening once a month. Some travelled hundreds of miles, giving up time and money that they might become expert and serve humanity better. The enthusiasm, earnestness and skill of those men has been felt

throughout the land. There is no section of the world today where you will find better dentistry than in the States I have mentioned.

The dental society, the study club and the clinic unit are practice builders and you are not eligible to such company unless you are ethical. The dentist who says he has no time for interests or activities outside of his practice is not living up to a full measure of citizenship and is overlooking a great opportunity of improving his practice. We frequently hear the statement that a dentist's hours are so long and his work so arduous that he finds little time during the day and is too tired at night to take a prominent part in the political, civic, social and religious life of his community. The excuse is a poor one. The busy lawyer who frequently has to work far into the night, studying the law pertaining to his case and writing his briefs, finds time to be conspicuously associated with various activities; the physician, whether he be specialist or general practitioner, has a full day, and many times nights without rest. The very nature of his work is a great call on his physical and mental forces, yet one finds in all the broader activities the physician taking a leading part. I can recall a great number of medical men who have served with distinction in your Dominion and Provincial legislatures. The dentist, though his day is long and he may have some irritating problems, yet when he turns the key in his door he locks his troubles behind, and is at liberty to spend his evening in some diversion.

Our work brings us in close contact with the heads of families, and the children from the time they are little tots until they reach manhood and womanhood. This should naturally secure for us the confidence of our community and make us eligible to leadership in the many educational, uplift and welfare movements that are claiming the interest and support of our best citizens.

The severest indictment I have ever heard against dentists was delivered by the head of the Department of English in one of our largest American universities. He was the guest of the faculty of the college I am connected with. I know he did not censure us for the purpose of humiliating or embarrassing us; instead it was to impress us as teachers, that our duty did not end in making dentists of our students, but that we should go farther and encourage them to attain some prominence in the great game of life. He frankly told us that we had no place in the world of letters, art or music, no prominence in politics, no record in public life, and were unknown in financial circles. He concluded by saying: I have heard from a reliable source that there are not four dentists in the City of Chicago whose worldly possessions amount to fifty thousand dollars. I plucked up my courage to remind the gentleman that if the standard of measurement of a man was the money he made, then his calling, that of teaching, would be zero among professions.

One of the outstanding factors in building up a successful practice is the starting with or acquiring as soon as possible a suitable equipment, one that will be attractive to our patients and possess all the facilities necessary for our various needs. The day of the old plush chair, red glass cuspidor and the foot engine has passed. Every hamlet has electric current and some kind of water pressure. Last fall I was invited to speak before the American Dental Dealers' Association at their annual meeting in Chicago on the subject: "Dentist and Dealer." I felt that I could register some complaints, suggest some improvements, and pay many compliments to this splendid organization. In order to secure some data on the quality and cost of equipment for different professions, I visited two surgical supply houses, and an engineer's and architect's outfitting company. I found that dental equipment was superior in design and workmanship. There is nothing to compare with our chairs, cabinets, units, motors and accessories. They are costly, but will last a life-time. I discovered that it cost much more for a dentist to start with adequate equipment than any other profession or calling.

In presenting these facts to the dealers I reminded them that a very large percentage of dental students were working their way through school, or were the sons of parents who were making great sacrifice to give their boys a dental education. When they graduate they are in debt. My plea was that they should have a heart and not load a beginner up with a lot of unnecessary and elaborate equipment, placing a financial obligation on him beyond his capacity to pay. A month before graduation our seniors are besieged with smooth-tongued salesmen and efficiency experts who try to convince them that to be successful they must instal the finest units up-to-the minute, radiographic outfit, an autoclave and a reception room furnished with period furniture. I give way to no one in my appreciation of a well equipped and artistically furnished office, but I have seen so many come to grief, who were under the impression that an elaborate outfit was the one essential that led to success. The opinion prevails among many that elaborate equipment and furnishings are a sure path to big fees. The efficiency expert told them so.

What a part the question of big fees seems to play in some offices today! It would seem as though the dental slogan is "Get the money." We all know that in the past too many dentists were insufficiently compensated for their services, and that far too many have labored for years and in the sunset of their lives would be in distress were it not for the aid of family or friends. Dentists' fees have not kept pace with the great advance in price of everything we use in practice. Rents have been doubled, dental equipment has more than doubled, supplies and laboratory work the same, and the expense of the home has increased alarmingly. Yet how many dentists have increased their fees one hundred per cent? There are some, however,

who place no limit on the value of their services. The fantastic fees that we hear about are almost unbelievable. In the building where I am located we have 254 dentists and 406 physicians. Every dentist has a woman assistant and there are one or two in every physician's suite. With such a large number of women engaged in similar work it is quite natural that there should be some comparing of notes. The stories that go the rounds through this channel about fees would lead you to believe that the Golden Rule is out of date. These professional brigands are doing dentists and dentistry a great injury.

With the ever-increasing demand for good dental service, there is no reason why the dentist of to-day and the future should not enjoy the fruits of his labor, and make adequate provision for his declining years. He can, providing he does not allow his tastes to grow faster than his income; he can, if he does not fall for the get-rich-quick schemes; he surely will if he conducts his practice along systematic and sound business lines. There are too many dentists who are practising in a haphazard business way, without any idea of the cost of doing business, and totally ignorant of their fixed overhead expenses, and wondering at the end of the year where their earnings have gone. The day has passed when it was considered bad form to associate business methods with practice. The stern exigencies of the times compel us to adopt some of the methods of the commercial world. We hear considerable nowadays about working and charging by the hour, time stamping the patient when they come and again when they leave. Personally I do not like this trade union way of charging, nevertheless it merits some consideration.

I know many excellent ethical men who have adopted this system, and they claim it is the only equitable way. I would suggest as an experiment that you adopt this—a simple method of ascertaining just about what your hourly compensation amounts to. Have your secretary keep a time record of several patients, with a variety of work from the beginning of the work until its completion; make your charges in the usual way, regardless of the time record. When through, take the amount of your charges, divide it by the hours recorded and see what it will average. If the average is not high enough, then you know your fees have been too low. You must also make allowance for bad debts and the unproductive hours. Several writers who have made a study of dental economics state that fully 40 per cent. of the time in our office is nonproductive. Many of these nonproductive hours can be eliminated by having efficient help.

Every dentist should have a capable woman assistant, not simply a girl in the office. She should be capable of keeping his records and books in a systematic way and attend to collections; help him at the chair and relieve him of much of the laboratory details. If practice

warrants it there should be one girl for secretarial work, and one or two for the operating room and laboratory.

Many of us can reduce our nonproductive hours by limiting the number of patients we see in a day. If we would give hour appointments, we could accomplish much more, do better work and give greater satisfaction to our patients. Most of us try to see too many patients in a day. One hour a day or more, if need be, should be devoted to short time appointments, examinations, consultation, and a charge should always be made for such services. We are all annoyed and lose much time by the patient who drops in any old time on the flimsiest pretext, requests immediate attention and too often expects such service without charge.

A common fault in many offices is the disregard of the value of the patient's time. We should not forget that the time of many of our patients is just as valuable as ours. Nothing provokes a business man more than having to wait from fifteen minutes to an hour, then have the dentist putter around for a few minutes and give him another appointment. Many a good patient is lost in this way.

In discussing office management this question is frequently asked: should we give a patient an estimate of the cost of the work to be done? When you consider how some have been stung by unreasonable fees, I think they are justified in asking something about the cost, and I think it advisable to give an estimate, but it should be flexible enough to allow for unlooked for conditions. To give anything like an intelligent estimate, it is necessary to make a very thorough examination. This takes time, and the first item to be included in making the estimate is a good fee for the examination. The discussion of the probable cost of work usually leads up to an understanding as to how the payments are to be made, and there should be a definite understanding between patient and dentist on this question. It will prevent subsequent misunderstanding, and you will have fewer bad debts at the end of the year. We all have patients whom we know are dependable and able to meet any obligation. Completion of the work and rendering of statement brings a prompt response. However, they are the exception, not the rule. Every dentist should have his statements out the first day of the month, and they should be statements of work done up-to-date as well as completed work. Many cases take months to complete. There is no reason why we should wait until it is finished before receiving any compensation for services rendered. There is also the additional advantage of keeping the patient familiar with the progress of the work.

Do not be afraid of offending a patient by pressing collections. The honest ones will appreciate your business sense, and the sooner you find out the others, the better.

According to reports from banking, mercantile, industrial and agricultural sources, the country is going through a season of business depression. Naturally the profession will feel the effect of this condition. It can only be temporary. There are some hopeful signs that the wounds of war which the whole world is suffering from will be healed, and once more we will return to our normal condition, a prosperous, happy people in a land of peace and plenty. The future of dentistry is indeed bright; everything tends to increase the demand for service; the profession is united, no factions, no cults, no parties, All that is necessary is to render honest conscientious service.

The Chairman announced that Dr. A. W. Thornton, Montreal, was unable to be present, but had tendered his best wishes for a successful Convention. He therefore called upon Dr. R. G. McLaughlin to take his place in opening the discussion on Dr. Gallie's paper. This Dr. McLaughlin did as follows:

DISCUSSION—DR. R. G. McLAUGHLIN.

Our very worthy Chairman came to me just as I sat down to lunch today and said that Dr. Thornton could not be here to discuss this paper and that he was asking me to occupy two and a half minutes in expressing our appreciation to Dr. Gallie and to say something on the subject of his paper. I felt, gentlemen, that it was almost an injustice to Dr. Gallie, a man who has come the distance that Dr. Gallie has come and who has put so much of his thought and his personality and skill into the preparation of that valuable paper, and also I felt it was an injustice to the importance of his subject.

Dr. Gallie comes to us for the first time I believe in many years, and he has blazed the trail, so to speak, in occupying our attention with this sort of a paper. "How to Build and Retain an Ethical Practice" is one of the burning questions in Dentistry, and I believe in Medicine, today. There was a time some ten or fifteen years ago when a young man of ordinary ability settling down, we will say, in the City of Toronto, found very little difficulty in working himself into a very lucrative practice in a comparatively short time. That day, gentlemen, for some time at any rate is past, I may say in the City of Toronto, and perhaps the same thing is true in other parts of the Province and of the Continent of America.

Dr. Gallie has treated the subject in a very broad and efficient way. He has thrown a great deal of thought, and practical thought, into the treatment of this subject. He started away back at the preliminary education of the would-be dentist, and rightly so, has laid great importance upon his academic education and the culture that would naturally follow a proper preliminary education. We know this: that when a young man goes into a locality to establish himself as a dental practitioner in that particular town or that particular city,

there are at least two pieces of "baggage" that he must carry with him and make use of, if he is going to make a success of his practice in that particular town. In the first place he must have with him what we know as "Efficiency," and in the second place he must possess the other that I spoke of as "Character."

Now my experience after some years in practice, and the experience of others with whom I have conferred, has led me to this conclusion, that the average patient of today is not looking for the highest degree of skill always in the case of his or her dental adviser. They do ask for at least the average amount of skill in that particular town or city; but there is one thing that the public today look for and always did appreciate in their dental adviser, and that is "Dependency," or Character, or Personality. What they feel they do want to know about you and about me is that if Mary or John, the little boy or the little girl in that family, is placed under our personal care, as dental adviser, that they will receive conscientious care and that we will render just as good service to that boy or girl as we would to the father or mother who might know more about it.

Now, Dr. Gallie has spread out his paper to cover a very wide area and a great deal of sound advice is given to us in the splendid epistle that he has read. May I, in a word, in a moment, attempt to boil that down into one universal or fundamental law that will be a guide for the young man who has just graduated from College, which he may take with him as a universal guide to help him establish himself in the city or the town which he is to enter. He naturally has great fears as to the possibility of failure. We all had those in the first few months and perhaps the first few years of our practice. I can remember very well in my first three or four months of practice in the City of Toronto, how I often wondered just where I was going to get hold of the \$30 or \$40 to pay the rent at the end of the next month. That perhaps was natural with a man who had some Scotch blood in his veins. But there is a fundamental law, that a young man going into a town to establish himself in practice, may rely upon to carry him over the first year of difficulty. And, gentlemen, that is the danger period with our young men. The question comes to everyone—and you can quite appreciate it: How am I going to make myself known to this locality? How am I going to establish myself in reputation and, as an individual, in this community without indulging in what is known as commercial publicity? And if a young man can get over that period of one or two years, I always think he is getting over at least the most dangerous period of his professional career. But I think this: if a young man will remember that he is going into that locality, in the first place as dentist; in the second place as a citizen,—that those two make up his entire vocation, and that he is called to that town or that city not only to be a dentist, but to be a citizen; that is, he is proficient in his calling, he is discharging his duties as a

dentist faithfully, honestly and well, and he is also discharging his duties as a citizen, taking an immediate interest in all the educational, and the social and moral interests of that community; I venture to say this, gentlemen, that he will succeed in establishing himself in the good graces and in the good will of that community, and that he will become known as a good dentist and as a good citizen and as a good all-round man who is going to be a valuable asset to that community quicker and better than he can possibly be by any kind of commercial advertising. That is the summing up of what I want to say. May I put it in this other way, and I put it in this way as a last word with my apologies to the Good Book, and I am giving it to the younger men, particularly:

"Seek ye first the good of the patient and the good of your community and all these other things shall be added unto you."

Dr. Gallie, in replying to the discussion said he wished merely to compliment the Association on their presiding officer, saying he had never attended a Dental meeting presided over by a more efficient officer than Dr. Conboy.

Address of Dr. F. J. Conboy at Luncheon in Honor of Dr. C. N. Johnson, Chicago

On Tuesday, May 27th, 1924.

Ladies and Gentlemen:

This Luncheon is held in honor of Doctor C. N. Johnson.

A really great man is the grandest object that this world ever exhibits. The heavens in their magnificence, the ocean in its sublime immensity, the mountains standing forth upon their granite foundations are all less imposing than a living man in the possession of all his faculties and powers.

And yet, thousands of men breathe, move and live, pass off the stage of life and are heard of no more. Why? They did not a particle of good in the world, none were blest by them, none could point to them as the instrument of their redemption, not a line they wrote, not a word they spoke could be recalled, and so they perished; their light went out in the darkness and they were forgotten. Not so with the honored guest of today—he has built for himself a monument of virtue that the storms of life can never destroy. He has written his name by deeds of kindness, love and mercy upon the hearts of the thousands who year after year have come in contact with him and he will never be forgotten. His name will be as legible on the hearts of his friends as the stars on the brow of evening.

Historians tell us that selfishness has been the motive power in life since Adam delved and Eve spun, but now and then men appear upon the stage of life's activities who place the joy of service before

the reward of selfishness. We are gathered here today to honor such a man, one who has not only risen to the highest position within the gift of the members of his chosen profession, whose name is upon the lips of every outstanding dentist in the world, but above all is loved and respected by all those with whom he associates and more profoundly by those who know him best.

I do not intend to take time to speak of Doctor Johnson's many accomplishments; within the short time at my disposal it would be absolutely impossible to cover the achievements of such an active and helpful life. Among the foremost men in dental literature, among the foremost men in dental practice, among the foremost men in dental education is our friend the illustrious poet, practitioner and teacher whom we honor today. He has ever maintained the dignity of his high profession and has performed, as he understood them, its many important duties. Doctor Johnson has always been a great worker and has a prodigious faculty for performance, and this, augmented by a marvellously keen intellect, has made it possible for him to accomplish tasks far beyond the reach of the ordinary individual. All men are not equal, the beauty as well as the happiness of the universe requires inequality; we must have hill and dale, mountain and valley, suns of all magnitudes, worlds of all sizes, and minds of all dimensions, in power and capacity. The man we today delight to honor was well endowed, and he freely and willingly used all his mental powers and faculties for the good of humanity.

The highest compliment that can be paid any man is to say of him—"He helped his fellowmen." How many great men owe their success to the sympathetic assistance and the sage advice given by a friend at the proper moment, and how many lives, which would have been great, have been blighted and ruined because the needed encouragement was not given or because the enthusiasm was deadened and the ambition killed by unkind and destructive criticism. Doctor Johnson has ever been a friend and helper of his fellow practitioner; to use his own words spoken of another,—“He has stooped to aid a fallen comrade whenever he saw one down and has put a prop under those whom he found trembling in the balance.”

Having passed through a period of hard and thorough preparation for the activities of life and having given many years of devoted and wholehearted service, he can now with the wisdom which comes from experience, and with the sympathy which comes from an accurate knowledge of human nature gained by direct contact with men and events, advise and counsel his perplexed brother and especially the young men before whom the golden gates of opportunity are just to open. As Dean of Students at the Chicago College, Doctor Johnson has been the honored instrument of having persuaded and induced thousands of young men to accept ideals and to follow a path

of service which led them to the fruition of riches, honors and pleasures, boundless as the universe and enduring as the ages of eternity.

Have you ever taken the time to consider the advantages and benefits which accrue from being brought, during the impressionable period of life, under the influence of the light which radiates from a pure and noble life? The beatific influence of an exalted life is beyond compare. I stood on the platform of a lonely station and there saw the light which gleamed from the headlight of a giant engine rushing onward through the darkness, heedless of opposition, fearless of danger, and I thought it was grand. In the open country in the early morning I have seen the light come over the eastern hills in glory, driving the hazy darkness like mist before a sea-born gale, till leaf and tree and blade of grass glittered in the myriad diamonds of the morning ray, and I thought it was grand. In the raging storm of a great city I have seen the light that leapt at midnight athwart the storm-swept sky shivering over chaotic clouds, mid howling winds, till cloud and darkness and shadow-haunted earth flashed into mid-day splendor, and I knew it was grand. But, the grandest thing next to the radiance that flows from the Almighty Throne is the light of a noble and beautiful life wrapping itself in benediction around the destinies of men and finding its home in the bosom of the everlasting God.

Life is a great struggle, a splendid campaign; happy the man who cultivates all his powers and uses them for the good of his fellows. How pleasing to him who has run this glorious race to survey from the lofty summit of his lasting fame the cumulative results of an active life developed in the light of eternity. How transporting to contemplate the proximate and the remote, the direct and the indirect beatific fruits of his labors, and to know that thousands of grateful souls recognize him as the man who by precept and example led them into the way of true happiness and prosperity.

Doctor Johnson, because of what you have done for dentistry and dentists, because of your love for mankind the world over as shown in your useful and altruistic life, and because you are our friend and brother, we ask you to accept this slight evidence of our love and esteem; slight, because no gift, no matter how large, how ornate, or how costly, could in any adequate measure indicate the admiration, respect and affection which we have for you. We present this small token in the confident hope that as you travel from place to place carrying everywhere the gospel of optimism, industry and brotherly love, it will ever remind you of your many friends in your native Province of Ontario and especially of those who delight to proclaim that they graduated from the Royal College of Dental Surgeons. We know you often think of your native land, the old home and your boyhood days. These beautiful and sacred associations and memories are so tightly entwined around your heart and mind that neither time nor distance can separate you from them. The

Land of the Maple is so near and dear that you often sing with the poet,—

“Her hills are singing to the skies,
The wild flowers deck her virgin sod,
So much of nature in her lies
She must be near to nature’s God.”

Tomorrow we separate, you go to attend to your many pressing duties and we go back to our fields of endeavor, but in the truest sense of the word we will not separate, for we will ever be bound together by mutual sympathies, helpful thoughts, and cherished memories.

“Thou goest thy way and we go ours,
Apart yet not afar,
Only a thin veil hangs between
The pathways where we are;
God keep watch ’tween thee and us—
This is our prayer.
He blesseth thee, He blesseth us,
And we are near.”

The luncheon was brought to a close after Dr. Johnson had expressed his sincere thanks and appreciation to the Convention for the many evidences of friendship and esteem that had been given him, and for the leather portfolio that had been presented.

THREE SONS OF CANADA.

In introducing Dr. C. N. Johnson of Chicago, the Chairman remarked, in referring to the outstanding work which Canada’s three sons, Drs. C. N. Johnson, Don Gallie and Bishop Du Moulin had accomplished in the United States: I think that Canada made a valuable contribution to the citizenship of the United States when these three men went over there and decided to spend the remainder of their lives as citizens of that country. We are delighted to have these three men visit us on this occasion. They are all going to talk to us, and I am sure they will have a message that will be interesting and inspiring. The first of these three speakers is Dr. C. N. Johnson. He needs no introduction. We have received letters from all parts of Ontario expressing the delight of our members to come to Toronto and have an opportunity of hearing Dr. C. N. Johnson.

Dr. Johnson was called upon to read a paper upon the subject, “What Teeth Should be Extracted and What Teeth Should be Saved?” His appearance on the platform was greeted with much applause. Dr. Johnson’s paper was as follows:

What Teeth Should Be Extracted, and What Teeth Should Be Saved

By C. N. JOHNSON, M.A., L.D.S., M.D.S., F.A.C.D., CHICAGO, ILLINOIS.

It may as well be recognized at the outset that it is wholly impossible to answer the question implied in the title of this paper in any definite and brief statement of fact or opinion, unless we content ourselves with the terse and off-hand assertion that all teeth should be extracted which cannot be made healthy by treatment, and all teeth should be saved that are amenable to successful scientific management. The difficulty is today that there are a large number of teeth which are on the borderline between safety and danger, or rather there are so many teeth of which no man can state with assurance whether or not they are safe or dangerous. The dental profession must have a keen conception of the possible damage that may be done by diseased and neglected teeth. We must stand "four square to the world" in our protection of the people against the ills which may arise from the presence of focal infection. We must recognize the complexity of the human organism, and the possible far-reaching effects if metastatic involvement. We must not close our eyes to any of the agencies of evil connected with the mouth and teeth.

Having formulated this as our bounden duty, there is another side to the picture. The history of the development of the present concentration on the teeth as factors in disease has many peculiar angles. From the time that dental literature began to be written our writers have sought to interest the medical profession in the teeth, and to impress them with their significance as agencies for good or ill. That for many years our medical men paid very little attention to the matter is not to be wondered at. They were chiefly concerned with what seemed to them the weightier questions of tuberculosis, cancer, cholera, smallpox, typhoid fever, diphtheria, etc.—those outstanding diseases which were carrying people off in spite of their best efforts. In the face of all this alarming array, it was not to be expected that medical men should give so very much attention to such minor matters as the teeth.

But a curious thing happened. One of their own members—Sir William Hunter, of London, England—wrote a paper on the Evils of Oral Sepsis. It was so striking in some of its assertions, and so emphatic in its declarations, that it at once commanded the attention of both medical men and dentists. Incidentally it raised some resentment on the part of dentists because of the almost sweeping indictment against dental operations in the form of crowns and bridges as the chief causative agencies in many systemic diseases. He euphoniously called them "gold traps of sepsis," a name which was probably not

far misplaced in the class of work which he was accustomed to see. The element of injustice which entered Sir William Hunter's discussion of the subject related to his broad condemnation of what he termed this so-called "American Dentistry"; when as a matter of fact the grotesque and abominable restorations which emanated from the London dental parlors which styled themselves "American," were no more representative of the better class of American dental practice, than would the perverted aberrations of the veriest medical quack represent the service of the ablest and best of the medical profession. The distinguished author may not in any sense have been responsible for the misconception, but that it was a misconception there can be no question.

But the most curious thing connected with the entire situation is this, that while Hunter is acclaimed, and justly so, as the man who first directed effective attention to the mouth and teeth as important agencies in disease, the kind of infection that medical men and dentists are most afraid of today was never in the remotest degree alluded to by Hunter at all. What he declaimed against were the accumulations and septic conditions at the gum margins due for the most part to the irritation of ill-fitting bands on crowns, and the retention thereby of infectious material. He speaks of swabbing the mouth in these regions with antiseptics as a remedial measure, but he never refers even incidentally to infections occurring in the apical regions at the ends of roots of teeth. It is these latter which have given rise to the greatest concern in our ranks today, and over which there is the most widespread confusion.

With this, as with most questions affecting the welfare of the people we serve, what we most need is balance; and balance is the one thing which in the recent past has been most conspicuous by its absence on the part of many practitioners, both medical and dental, when approaching this matter of focal infections about the teeth. The moment the attention of the medical profession became concentrated on the teeth as possible causative factors in disease, there began a terrific landslide which has swept countless numbers of perfectly good serviceable and innocent teeth to destruction. There is no gainsaying this statement—it is a profound and lamentable fact. In its net results it constitutes one of the dark chapters in our professional history; and yet in contemplating the circumstances which brought it about and the gravity of the issues involved, it gives rise not so much to censure as to sorrow. It speaks merely of the limitations of human judgment and the uncertainty of much of our so-called scientific knowledge.

Let us be frank; let us be honest; let us weigh this matter in the light of the calmest judicial evidence. Even then it is inevitable that we shall make mistakes, but we shall at least not work the hideous ruin that has trailed in the wake of many a professional practice in

recent years. The thoughtless, needless, worthless extraction of good serviceable teeth is no light matter, any more than is the retention of diseased teeth that are a menace to health. Let us be broad-minded and open to conviction, but let us not be stampeded out of our common sense, based on observation and experience, by the far-flung cry of every excited enthusiast.

There should be no controversy between medical men and dentists over this important question—there should be only the frankest discussion, and the most cordial helpfulness one to the other. If dentists on the one hand feel that medical practitioners too frequently condemn teeth without due deliberation they must remember that the prime function of the medical man is to get his patient well, and that whatever seems to him to stand in the way must be eliminated. If the dentist knows for a certainty that the medical man in his concentration on the teeth to the exclusion of many other possible factors in disease, is in the habit of ordering the extraction of many useful organs of mastication to the ultimate detriment of the patient, it is his duty to call the physician's attention to this fact, and reason with him on the possible harm he is doing. Papers by medical men should be read before dental societies, and by dentists before medical societies. The paramount thing is the welfare of the patient, and this can be conserved only by the right kind of co-operation.

If it is true that medical men can legitimately claim a wider field of knowledge than that possessed by the dentist, it is equally true that dentists may legitimately claim a more intimate knowledge of the teeth and their supporting structures than can the physician. Neither physician nor dentist can claim infallibility about anything, and thus the attitude assumed by some physicians in ordering teeth extracted without consultation with the dentist is not only illogical, but in many instances it has proved disastrous to the patient. In a situation in which no man may claim absolute knowledge it is well that we "make haste slowly," and this brings us at once face to face with the main theme of the present paper, what teeth shall be extracted, and what teeth shall we attempt to save?

In deciding this question several errors are likely to creep in, one of which is that too many practitioners wholly ignore the fact that there is any difference in the relative value or importance of different teeth. The strategic position of a tooth may well be considered, and may logically be a factor. The ease or difficulty with which a vacancy caused by the extraction of a tooth can be filled by artificial substitutes must have some bearing on the decision. If a central incisor is under suspicion, and the other teeth in that vicinity are sound, we are justified in pausing before we extract the central and thus create a condition which is hard to remedy without placing the adjacent sound teeth in jeopardy. There are various situations which render the extraction of a tooth a rather serious matter. We cannot

simply wave our hand across x-ray pictures and say that certain teeth should be extracted without a further study of the case to see what may be involved in the loss of these teeth.

Of course, the rejoinder to all of this will be that if a tooth or teeth are causing systemic trouble they should be sacrificed no matter what their strategic importance, and this would seem to be an unanswerable argument. It surely would be unanswerable provided it were possible for any man to say with assurance that a certain tooth was causing systemic disease, but up to this time no man can consistently claim such infallibility. Every tooth that has been extracted for the purpose of curing systemic trouble has been extracted solely on suspicion. No man today is wise enough, with all his bacteriological tests, to say in advance what the extraction of a tooth will do for a patient. It is true that in many cases the suspicion has been well founded, and the patient has been benefited by the extraction. It is true that there are many teeth where the presumptive evidence is so great that there should be no hesitancy about extraction. It is also true that there are some teeth whose strategic importance and functional value is so nearly nil that in case there is the slightest suspicion that they are doing harm they should be taken out. We should use judgment, and not be prejudiced one way or another. But here is a very significant fact that we cannot ignore, and which should have a bearing on our decisions. It has just been said that in many cases the extraction of the teeth has benefited the patient, but unfortunately the evidence in rebuttal goes to show that there are just as many cases in which the extraction of the teeth has apparently done the patient no good whatsoever. There are altogether too many edentulous mouths today—made so in the fruitless effort to cure a disease which continues to progress in spite of the mutilation of the mouth—scores of disappointed patients who have been promised surcease of their troubles by yielding up their teeth. And then there are other cases where patients have been cured of their ailments and retained their teeth—retained them against the advice of their physician. At least, this may be said—there is as much evidence on the one side as on the other, and until we know more about the subject than we do today we are not justified in sacrificing so many teeth as we have in the recent past.

This does not mean that we are to ignore the possible evils of infected teeth, or that we should settle down into a smug complacency regarding this most serious question. We should go into every case with the most conscientious endeavor to do whatever thing shall be the best for the patient, after weighing all the evidence at our command. And this leads us at once to the consideration of certain evidence which in the past has been relied on more than any other in passing judgment on teeth. For good or ill the x-ray has been the chief medium by which men have formed their opinions of the teeth, and there is no estimating today the aggregate of good or of harm that has been done through this medium.

The value of x-ray evidence has been sufficiently discussed to make it unnecessary to enter on it here, except perhaps to reiterate some of the things that have been said concerning it. At least we may be assured of one thing, that as a medium of detecting infection at the apices of roots of teeth the x-ray is almost wholly a failure. It does not demonstrate an abscess, it does not prove infection, and it does not show pus. We might as well recognize this *at once*. The only thing the x-ray does is to reveal the varying degrees of density in bone around the roots of teeth, and in many instances it does even this imperfectly,—largely, it may be said, through imperfect technique in its use. But with all of its limitations it is a most important adjunct to our various means of diagnosing trouble with the teeth and their supporting structures, and taken at its face value we may still reap great benefit from its use provided we do not make the prevalent blunder of expecting from it the miraculous.

When the x-ray reveals a perceptible shadow at the apex of the root of a tooth we at least know that something has happened, but the significance of what has happened or the present activity or inactivity of any possible destructive process cannot be determined by any man living through x-ray evidence alone. And I think we might go even farther and say that it cannot be determined with certainty by any evidence which we at the present time have at our command. We are groping more or less in the dark, and with all due respect to an honorable allied calling, so also is the physician. Let us be honest. Let us face our patients with the frank admission that in many cases we do not know. Let us admit that we are merely doing for them the best we can under our limitations, and that we do not claim infallibility. Let us freely acknowledge that we have only a ray of light here and there, with the great broad expanse of dental pathology still largely unilluminated. If we do this it will be better for us and infinitely better for our patients.

And now with all these limitations clearly in mind, let us approach a more concrete consideration of the main theme of the present paper. It is often a difficult matter for the conscientious dentist to determine whether he should extract a tooth or attempt to save it. Leaving out of consideration for the moment the attitude of the patient's physician toward this question, and the effect of this attitude on the patient's mind; we may well consider several factors which should govern our decision. The gravity and persistence of the patient's illness would be one factor. If a patient were seriously ill over a protracted period from a disease which might logically be attributed to focal infection, and there were teeth which showed rarefied areas, we should not take the responsibility of retaining those teeth with the possibility that they might be doing harm. They should be extracted even though their extraction is admittedly an experiment. But if the illness is recent and not critical, if it is only an occasional rheumatism or neuritis, and the teeth happen to be of strategic or functional value, we should not

extract them merely because the radiogram shows a slight rarefied area. I am aware that this advice will be considered the rankest heresy in the light of present-day procedure, but I am willing to go on record and trust future developments to convict or acquit me. I would not extract a valuable tooth without making the attempt to treat it and save it. I conscientiously think the extraction of a good, serviceable tooth to be an acknowledgment of therapeutic failure on our part. I admit that all pulpless teeth cannot be successfully treated and saved, but I claim that a vastly greater number can be so treated than have been in the recent past. I think that the day will come when we will look upon the present era of dentistry as one of which we may well be ashamed. We have been stampeded out of our sanity by this hue and cry of focal infection. We have followed the leaders over the fence of fanaticism till we have become lost in the wilderness. We have permitted patients to become frightened out of their senses by this bug-bear, and we have created more unhappiness than we have health. The crime of the psychological effect on patients by the alarming terms that have been rung in their ears will never be atoned for. No dentist, and no physician, has the right to frighten patients needlessly, and patients have been so frightened times without number. Let us be honest.

I am not seeking to minimize the ills of focal infection. I will go as far as any practitioner to clear up a mouth and make it healthy, but that does not mean that I will extract every pulpless tooth that has a rarefied area at its apex. And let me make this further brief observation about focal infection. Since it is so much in the professional mind, and its ills have been so emphasized, might it not be legitimate to ask its real significance? Might it not be well to look a little further into it and see whether it is a cause or an effect? Might it not be the result of some fault in the organism, in other words, might it not be secondary instead of primary? Might there not be a basis of nutrition and metabolism back of all of this? Are we not approaching these affections entirely from the wrong point of view? When we impress people with the proper methods of living; when we teach them what to eat, and how to breathe, and particularly how to *think*; we shall do more to eliminate disease than we shall by extracting all the pulpless teeth in all the mouths of all the people. And let me further say that in many of the cures attributed to the extraction of teeth, I am convinced that much of the benefit has come through the fact that the patient has been wisely advised by the physician about better modes of living. Their ailment has brought them face to face with the necessity of taking better care of themselves—eating more rationally, and living more rationally. And much of the benefit has come from this.

* * * *

Further instalments of the official proceedings of the Convention of the Ontario Dental Society will be published in subsequent issues of Oral Health.

Full Denture Construction for the General Practitioner*

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*Professor of Prosthetic Dentistry, Dental School,
Western Reserve University.*

(Continued from last issue.)

LOWER IMPRESSION.

AS A RULE an accurate lower impression is more difficult to obtain than an accurate upper impression. It is probable that in an equal number of upper and lower dentures a majority of our denture troubles is caused by the lower. This is largely due to the fact that adaptation plays a comparatively small part in the retention of the lower, and also to the fact of the increased area of soft movable tissue attachments around its borders. It is more important that the principles of tissue displacement be carefully noted in the lower than in the upper, because the lingual attachments as a rule are very frail and their point of attachment very deceiving. It may be stated as a rule to which there are no exceptions that the finished lower base must not extend beyond the base line and into the active tissues.

The *base line* is a term used by the late Dr. Geo. H. Wilson and is intended to designate the extent to which the finished base may extend without impingement upon active soft tissues or in other words, the foundation that may be used to support the finished lower base.

One of the chief criticisms of most of the compound impression techniques is that in the lower arch the excessive and oftentimes unnatural movements produced by the patient during the act of "muscle trimming," produces a false marginal turn to the impression which narrows it to such an extent that the ridge itself is about the only portion of the arch actually secured in the impression, while in reality there is in most cases, a wide bony base that may serve as a valuable aid in stabilizing the denture. In almost every case it will be found that nature has provided us with a wide bony base or foundation of which the ridge itself may be only a small part. To confine the stress of mastication to just that portion covered by the ridge is exactly the same as building a strong stone foundation for a building, and then placing a two by four board on edge and then constructing the building on only this narrow support. It is plain to be seen that a narrow base just fitting the ridge, no matter how accurately could not pos-

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sibly stand the stress of mastication so well as a wider base which distributes this stress over a much wider area.

The lingual flange on the lower base is a great aid in stabilizing and maintaining the denture in place, but it is by no means possible to make use of this in every case. In cases where the lingual attachments are very high, the floor very full, and where, when the mouth is opened moderately and the tongue raised, these tissues fold over and almost cover the lower ridge, it is absurd to attempt to force these tissues down and hold them permanently out of their normal position by placing a lingual flange on the base. The denture will either continually raise or severe soreness is sure to be the result.

If the impression can be secured and the base made to extend well distally, even starting to make the turn upon the ramus of the mandible, it is many times a great aid toward stabilization. This, however, because of anatomical conditions, can not always be done.

After the operator has thoroughly familiarized himself with all the peculiarities of the case by digital examination and inspection of the study casts, the next step is to select a metal tray that will most nearly fit the case. Here again the study cast will render valuable assistance. Trays Nos. 11A, 12A, 13A, 1, 3 and 5, made by the Detroit Dental Mfg. Co., will be found to give an assortment that will meet the demands of most any case.

Some trimming and contouring will be found to be necessary in a majority of cases, therefore a soft pliable metal tray is very desirable. After trimming a metal tray the operator should always make sure that the edges are again well rounded and smooth so as to prevent injury to the patient.

When the proper tray is selected next contour a piece of fuse wire twelve or fourteen gauge to lay neatly in the base of the tray. This will serve to act as a reinforcement to the tray compound tray during the necessary trimming and preparation and prevent breaking.

The S. S. White Tray Compound is next heated as described in a foregoing chapter for the upper impression, and then carefully placed in the selected tray on top of the fuse wire. The tray should be well filled but no excess should be allowed to extend over the borders of the metal tray. Any excess thus permitted or placed may have a tendency to drag over the lips when the tray is inserted into the mouth and cause a fold in the material in the border, and this will break away during the preparation of the tray and many times will necessitate the taking of another tray compound impression.

The surface of the tray compound is now seared over an open Bunsen flame to remove the finger marks and soften and glaze the surface. It is next dipped in warm water to temper and moisten the surface to prevent burning the patient and is then ready to be inserted into the mouth.

The operator now stands directly in front of the patient and the metal tray carrying the warm tray compound material is inserted into the mouth with a rotating or turning motion, or starting the tray in the mouth sidewise and turning it to the correct position as it enters the mouth. The tray is now dropped in approximately the correct position and the index finger of each hand is placed well inside of either cheek and the cheeks are distended buccally as far as the tissues will permit. This will prevent any folds of the cheek tissue laying between the ridge tissues and the impression material. The index fingers are next placed on the metal tray in the molar region and it is gently pressed to place with a slow steady pressure. As soon as it is seated it is firmly held in place while the middle finger of each hand is firmly pressed against the cheeks pressing them in and over the impression. This movement brings all the buccal tissue attachments to their approximate high point of attachment and definitely outlines the "turn" of the buccal "base line." The buccal tissues are almost immediately released and while the operator is standing directly in front of the patient he tells him to "Do just as I do." He then demonstrates what is to be done by just touching the tip of the tongue to the upper lip. When the patient repeats this movement the tissues in the floor of the mouth are brought to their highest working position, thereby outlining or marking in the tray compound the lingual turn of the base line. Some operators accomplish this by simply instructing the patient to "Stick out your tongue." This procedure is not so good, because the eagerness on the part of the patient to assist seems to give them the idea that the farther they protrude the tongue the better it will be. Therefore they extend it as far as possible, which action raises the tissues in the floor of the mouth to their *highest* point, which is an abnormal position in so far as ordinary working conditions are concerned. The finished base will never be called upon to meet such a condition in ordinary use, and such a position will result in excessive trimming of the lingual flange or lingual turn and thus lose some valuable bearing space. This step is not so important however at this particular part of the technique as it is later on in the finished plaster of Paris impression.

As soon as the tray compound has thoroughly hardened it is removed from the mouth and immediately chilled in cold water and then inspected. The inspection should show whether or not the border turns of the impression are all well rounded and full.

The next step is to remove with a sharp knife all overhanging masses of tray compound that would have a tendency to lock the tray compound to the metal tray. Then the tray compound impression is removed from the metal tray.

This tray compound impression now becomes and will hereafter be referred to as the *tray*.

It will be noted that around all the margins there is a more or less

definite "turn" showing where the tissues have pressed the excess tray compound back and away from their attachment to the base line.

This excess material is now all trimmed away to relieve tissue displacement at these points. Special care should be given the treatment of the lingual flange should one be present. That portion of the tray forming the lingual flange should be trimmed as thin as possible. In case there is still a doubt in the operator's mind as to whether or not sufficient relief of this region has been established, it is sometimes advisable to heat over a very small flame one flange at a time and replace in the mouth, and holding the tray firmly in place again to have the patient touch the upper lip with the tip of the tongue. The soft marginal tissues can partially turn away most of the excess material in this thin soft area where it would be impossible for them to do so with a larger mass of material. When the excess tray compound material is all trimmed away from the margins as indicated by the turn of the material around the borders, and these trimmed areas are all well rounded and smooth, the tray is then placed in the mouth and held firmly in position with the fingers of one hand, while the index finger of the free hand inspects the borders to make sure that at no point does it extend beyond the base line and into the soft tissues around the buccal or labial surface and that the lingual margins will permit of freedom of movement to the lingual tissues. The test of attempting to raise the impression by lifting on the cheek or lip tissues is an unnecessary and unfair test, because this is submitting the case to a test it never will be called upon to meet during normal function. Many perfectly good and serviceable dentures may be easily raised in this manner. The finished tray compound should rest comfortably in the mouth with no unnatural pressures upon any of the underlying or marginal tissues. It is then ready for the final impression which will bring out the finer lines and detail of the mouth conditions.

The technique for mixing plaster of Paris for impression taking has been covered in a preceding chapter, but let me again state that if the same uniform and consistent results are to be obtained in plaster of Paris impression work, it is imperative that a definite systematic technique be followed for every mixture. The plaster of Paris for the lower impression is mixed in exactly the same manner as for the upper. However, it is sometimes advisable to allow the setting process to advance a trifle farther, because when too soft the plaster of Paris runs from the tray when it is inverted to be placed in position in the mouth.

When the plaster of Paris is properly mixed and placed on the tray, the operator immediately assumes a position directly in front of the patient, and the tray carrying the soft mix of plaster of Paris is quickly rotated into the mouth and dropped to its approximate position. The index fingers of either hand quickly distend the buccal tissues to allow the impression to settle to its correct position. The

index fingers are now placed upon the tray in the molar region and with a slight oscillating motion accompanied by a light but steady pressure the impression is seated and held firmly in place while the middle finger of each hand brings the cheeks inward and over the impression. This position of the cheeks is almost immediately released and the patient is again instructed to follow the operator in lightly touching the upper lip with the tip of the tongue. This position should be held long enough for the plaster of Paris to develop sufficient body to support and retain its shape. The lower impression, unlike the upper, is held steadily in place until the plaster of Paris has thoroughly set. After this setting takes place all small scraps of loose plaster of Paris are carefully removed from the mouth. The impression is loosened one side at a time and carefully removed from the mouth. If at any point the black tray compound has sharply cut through the plaster of Paris and can be seen to have forced itself into the soft tissues, this area should be trimmed or scraped to afford sufficient relief and all of the plaster removed from the tray and another impression taken. If the result shows a smooth, even, sharp impression of all the fine lines and details of the mouth it can be accepted as one that will give the desired results.

A finished impression never should be allowed to stand any longer than is absolutely necessary before it is prepared for pouring and the cast poured. It is true that the plaster of Paris will undergo some slight changes due to drying out, but the greatest danger is that of chipping when the cast is eventually poured.

(To be continued.)

Editorially Expressed

*"If you covet Learning's prize, climb her heights and take it;
In yourself your future lies, life is what you make it."*

WE have heard some of our brethren complain that dentistry, as a profession, is not looked upon with the same degree of respect as other professions, and that it is not accepted and recognized as its true value to society merits. For one reason or another it is intrinsically repulsive to the finer senses of social culture and foreign to the thought of intellectual accomplishments.

The suggestion has no doubt an element of truth in it. Not that all dentists are social outcasts or that some members of the profession have not commanded the highest respect of the thinking world for their very wonderful intellectual capacities, but the "rank and file" have not been able to score heavily in the estimation of the communities in which they live and presume to serve. If we concede this condition to be a fact there should be some reason for such a state of affairs and a remedy proposed and applied.

If we might suggest an answer, it would be that we do not have

sufficient professional respect, proper regard for our standing in the community, interest in civic and social affairs, and a definite well-defined determination to make our service respected, and thus command the admiration of society.

The status of the dentist is as he would have it. Go into the average office and observe his methods of treating the public and his technique for rendering service in health-conserving operations. Find out his attitude toward the three great agencies for advancement of the profession and improvement of its members, namely, the dental school, dental literature and dental organizations. The information gained will often prove as disappointing as it is enlightening.

You will often find he doesn't discuss the dental school of his city with any fervor. In fact, he will confidentially agree that the institution as now organized and operated is no good, or, on second thought, declare it never was any good, and, excepting for just a few fellows (including himself) out of the hundreds of its graduates, it has not sent forth men competent to engage in the practice of dentistry. The fault for this condition cannot be charged against him, because he has taken no interest in the matter.

He doesn't read the dental journals, because, in the main, the articles contained were written by four-flushers, they are impractical, extremely overdrawn; and his methods have been so universally successful, why worry about such fol-de-rol?

The dental society is a bunch of fellows who get together to throw the "bull" and then get back in their offices to pass the buck on to their patients at a much higher fee than he charges for an equal or superior service. Of course, he takes one morning off during the annual meeting to go to the exhibit room, where he is helped to a shopping bag, passes quietly and with much dignity from one exhibit to another collecting stray samples.

And so he goes on through life, without once coming out into the fresh, pure, sunlight of a wide-awake, inspiring, enthusiastic spirit of service which has been created, and is being perpetuated, by a small minority for the benefit of all who desire to accept. And so we will be respected and occupy a more honorable rank when we will.

If you want to be fair to yourself and those you serve, and from whom you gain your livelihood, come out and lend a helping hand in this great problem of service to which the dental profession is consecrated. You are not conferring a favor on the officers of the association by attending the meetings, you are giving yourself an opportunity to do your duty in improving your service. It isn't that you can't afford a few days out of your office; you can't afford to remain away from the meeting. The sum total of our various attitudes toward our work and the service we render establishes the standard from which society estimates our value.—*Maryland State Dental Bulletin.*



BRITISH COLUMBIA—A. T. OBERG, D.D.S.

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ALBERTA—JOHN W. CLAY, D.D.S.

914 Herald Bldg., Calgary

SASKATCHEWAN—C. W. PARKER, D.D.S.

Imperial Bank Bldg., Regina

MARITIME PROVINCES—J. STANLEY BAGNALL, D.D.S., Commodore Apts., Halifax, N.S.

MANITOBA—W. W. WRIGHT, D.D.S.

767 Warsaw Ave., Winnipeg

ONTARIO—Lieut.-Col. W. G. THOMPSON

28 King St. West, Hamilton

QUEBEC—ARCHIE N. JENKS, D.D.S.

Medical Arts Bldg., Montreal, Que.

ALBERTA

A SPECIAL meeting of the Edmonton Dental Society was called for July 4th last. This took the form of a farewell banquet to Dr. R. W. Conn, of Edmonton, who is leaving Alberta to take up practice at Vancouver. Dr. Conn will specialize in Exodontia.

The members of the Society expressed their regret at the departure of Dr. Conn, feeling that they were losing one of their most useful members. They presented him with a suitably engraved gold mounted fountain pen, and wished him good success in his new home.

* * * *

THE Annual Meeting of the Alberta Dental Association was held in Calgary, July 7th last. On account of the Canadian Dental Association meeting at Vancouver no dental programme was put on, the meeting being called only for the transaction of business.

Dr. A. E. Hennigar, Calgary; Dr. M. L. Moore, Medicine Hat, and Dr. A. B. Mason, of Edmonton, were re-elected as members of the Board of Directors. The officers of the Association are as follows: President, Dr. Leslie McIntyre, Edmonton; Vice-Pres., Dr. V. H. Macauley; Secretary-Treasurer, Dr. A. E. Hennigar.

Dr. O. F. Strong, of Edmonton, has had before the Association for some time a motion asking the Legislature at Edmonton to put through legislation to allow Dental Nurses to practise. The form recommended by Dr. Strong followed that now current in California.

The motion was finally voted out, the majority of the members at this meeting deciding that opinion is too divided in those States where Laws of this sort are in effect, to allow them to vote for possibilities of trouble in Alberta.

The Association voted that in 1925 study courses in three or four of the principal cities be put on at their request by the local Dental Societies, and that the Directors make a grant of a sum not to exceed \$2,000.00 to assist in financing.

J. W. C.

MARITIME PROVINCES

THE thirty-fourth annual convention of the Nova Scotia Dental Association was held at Wolfville on the 15th and 16th of July.

The meeting was most successful; the attendance has been steadily growing during the past few years, and this was the best yet. The first day was devoted to routine business matters, including the election of officers for the coming year, which resulted as follows:

Pres.—Dr. W. C. Oxner, Halifax.

1st Vice-Pres.—Dr. J. T. Roach, Wolfville.

2nd Vice-Pres.—Dr. T. Melanson, Yarmouth.

Secretary—Dr. J. Stanley Bagnall, Halifax.

Complete Exec.—Dr. J. P. Parker, Sydney.

Dr. Faulkner, Secretary-Registrar, gave the annual report of the Dental Board. Two were prosecuted for illegal practice during the past year, convictions being obtained in both cases.

Dr. Ryan, as Dean of the Dental Faculty of Dalhousie University, reported the most successful year of the college so far, with the largest graduating class. He outlined a scheme of prizes for work in the Senior year, which should bear the name of the Frank Woodbury Memorial Prizes, in honor of the man who did so much for the development of the profession in Nova Scotia.

Dr. G. K. Thomson gave a report of the activities of the Oral Hygiene Committee during the past year.

The second day of the Convention was devoted to papers in the morning and entertainment in the afternoon. The first paper was on "Recent Developments in Partial Denture Prosthesis," by Dr. J. Stanley Bagnall, of Dalhousie Dental College. The paper was followed by an interesting discussion.

The next paper was on "Some Phases of Dentistry for Children," by Dr. A. C. Mackenzie, of the Pre-School Age Dental Clinic of the Massachusetts-Halifax Relief Commission. Dr. Mackenzie, who has the honor of opening the first Pre-School Age Dental Clinic in Canada, dealt with her work at that clinic and the measures taken in the treatment of her patients. This paper was followed by a long discussion on the methods most advisable for children's dentistry. Some of those who followed after the essayist did not agree with her in the use of cements as a filling material, but preferred amalgam, especially copper amalgam. Dr. MacArthur gave an interesting account of his experiences with one little patient, who at the age of seven, has more than 80 fillings in his mouth.

Dr. H. S. Thomson came in during the morning, after his usual happy faculty when a convention is in progress, and gave one of his much appreciated talks.

Wolfville is in the heart of the country made famous by Longfellow in "Evangeline" and through the kindness of the local dentists the visitors were shown the beauty spots of the surrounding country.

The session closed with an invitation to meet in Digby in two years' time—the meeting next year being clinic year in Halifax.

* * * *

THE annual meeting of the Nova Scotia Provincial Dental Board was held on July 16th. The following were elected for the coming year:

Pres.—Dr. W. H. H. Beckwith, Halifax.

Vice-Pres.—Dr. W. W. Woodbury, Halifax.

Sec.-Registrar—Dr. A. W. Faulkner, Halifax.

* * * *

THE annual meeting of the Western Counties Dental Association (Nova Scotia), was held at Bayside Farm, Weymouth North, on June 30th. The meeting was a business one, a number of matters of importance being taken up. After the meeting supper was held at Bayside Farm. Following were elected for the coming year:

Pres.—Dr. E. S. Allen, Yarmouth.

Sec.—Dr. Taylor, Yarmouth.

* * * *

THE annual meeting of the N. B. Dental Association was held in St. John on July 8th. Routine business of the Association was attended to. Following were elected for the coming year:

Pres.—Dr. G. T. Leighton, Moncton.

Vice-Pres.—Dr. A. J. Coughlan, St. John.

Sec.—Dr. F. A. Godsoe, St. John.

J. S. B.

Canadian Dental Association Meeting

THE Convention of the Canadian Dental Association, held in Vancouver, 4th to 9th of August, 1924, was well attended and an unqualified success. Dr. W. J. Bruce, the members of the Local Committee, and the dentists of British Columbia, deserve great praise for the way in which the Convention was planned and carried through. The B. C. men proved themselves to be ideal hosts and made the social features of the Convention of special interest.

Officers were elected as follows:

Hon. Pres.—Dr. S. W. Bradley, Ottawa.

President—Dr. Geo. K. Thomson, Halifax.

1st Vice-Pres.—Dr. Emory Jones, New Westminster.

2nd Vice-Pres.—Dr. John Clay, Calgary.

Sec'y.-Treas.—Dr. J. Stanley Bagnall, Halifax.

It was decided to hold the 1926 meeting of the Association in Halifax.

Official reports of the Convention meeting will be published in subsequent issues of ORAL HEALTH.

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EDITORIAL

Reciprocity in Dental Licenses

DENTAL Licensing Boards in United States, Canada and Great Britain have frequently expressed approval of the principle of reciprocity in dental licenses. Such an attitude is an indication of progress in the dental profession.

To arbitrarily limit practice to the Province or State in which a graduate originally qualified would have a hampering effect on the development of dentistry throughout the world. Such a policy would exercise a narrowing influence upon the dentist himself and tend toward a spirit of provincialism. It has been generally recognized, especially in recent years, the advantages gained by interchange of ideas with persons engaged in the same activities in various parts of the world.

However, in practice, even in adjoining States where dental standards are equivalent, reciprocity in dental licenses seldom obtains. There is always a lurking suspicion that one State or Province might become a "dumping ground" for another. This, of course, would be manifestly unfair.

We believe that the solution of this problem lies in the direction of having all applications for practice in another Province or Country received by the Official Licensing Board where the dentist is practising, and that this Board then take up the matter of transfer with the Licensing Board of the Province or Country where the applicant

desires to practise. The idea would be to equalize the transfer of practitioners from one country to another, the whole arrangement being based upon the principle of equality in numbers.

It might be well to consider applications only from candidates who had taken their whole course in the Province or Country in which they were practising. This would prevent a candidate from transferring from one College to another during his dental course, with the motive of practising in another place where a reciprocal arrangement would permit. Also that regulations apply only to candidates who had matriculated in the regular way and had completed the full regular dental course.

The advantage of having applications dealt with through the Licensing Boards, rather than by personal application, would be that the professional and ethical standing of the applicants would bear the stamp of approval of their home authorities, and should make a reciprocal arrangement easily possible between States where the dental standards are on a parity.

Such a plan as outlined above, while curtailing a general exchange on a large scale, would give to dentists desiring to reside elsewhere, an opportunity of procuring a license to continue the practice of their profession, and would doubtless be helpful in broadening the ideas of the members of the profession with whom these men would come in contact.

Contributions and Committees of the Ontario Dental Association

THE Ontario Dental Association have contributed \$1,000.00 to the Canadian Dental Research Foundation; \$1,000.00 to the Canadian Dental Hygiene Council, and \$500.00 to the Ontario Oral Hygiene Committee for educational purposes.

The Board of Governors of the Ontario Dental Association for 1924 is as follows:

Chairman—Dr. F. J. Conboy.

Sec'y.-Treas.—Dr. John A. Bothwell.

Committee on Clinics—Dr. S. Clappison, Hamilton (Chairman), Doctors Campbell of Galt, Walter Thompson of Hamilton.

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ORAL HEALTH

A JOURNAL THAT STANDS FOR THE "OUNCE OF PREVENTION," AS WELL AS THE "POUND OF CURE"

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Dr. C. N. Johnson to the Dental Profession

PROFITABLE FUN.

FUN just for the fun of it is no fun at all. Real fun consists in doing something which, while having diversion in it, is at the same time useful. To produce something where before there had been nothing is real fun. To pull a burdock up by the roots, and plant a grain of wheat is fun. To build a bird house and see the songsters make a home in it is fun. To scratch the surface of the soil and scatter flower seeds, and see them come up and blossom and glorify the earth is fun. To make a dog-house for Towser and see him snuggle up in it at night is fun. To bed Dobbin down with a thick mat of straw, and come out next morning and find him rested and pawing for his oats, and see him plunge his nose deep into the golden grain and begin to munch greedily and contentedly—little recks he of thorough mastication—this is fun. To walk down in the pasture lot and feel the soft turf springing under your feet at every step and round up the cows and drive them home to be milked—this is fun.

To raise the hood of an automobile and wipe off the engine, to clean the spark-plugs, to oil the bearings, to drain the crank-case and see that new oil is poured in—just the right amount—to fill the gasoline tank, and turn up the grease-cups, to tighten the nuts everywhere and put some air in the tires, to take a soft cloth and polish everything clean and bright, and then to start the engine and hear it hum rhythmically without a miss—that is fun. To roll along on a country road and see the changing landscape and hear the exclamations of delight from the dear ones in the tonneau, to overtake a tired bare-foot boy with flapping hat-brim, and pick him up and take him wide-eyed to his destination—that is fun.

To wheel a baby-carriage and watch deft feminine fingers tuck

the wraps around a tiny, tender, chubby bit of humanity is fun. To go a trifle out of your way to carry a basket of fruit or a bouquet of flowers to a sick friend; to write a letter of congratulation to one who has succeeded, or a letter of sympathy to one who has failed; to say a word of cheer to the despondent or a word of warning to the wayward; to put your arm around a fallen brother and lift him hopefully to his feet; to make a chum of one younger than yourself and enter heartily and sympathetically into his aspirations—to help him plan for the future and then to see that his plans are made to mature; to direct the footsteps of youth, and smooth the pebbly path of old age; to slay a slander and leave it prone and innocuous at your feet; to check a bit of gossip before it becomes current, and to send a good word to the uttermost ends of the earth; to speak well of people if you speak at all; to do a kindly act and not let anybody know of it; to get into the thick of things whenever wrong is being done, and to stay in till the wrong is righted; to play with children, and commune with sages; to harbor a favor and forget an injury; to draw the line rigidly and resolutely on your own behavior, and to be lenient with the behavior of others; to be stern with yourself and forgiving with your fellows; to magnify the joys of life, and belittle the trials; to play the game manfully and comply with the rules; to accept defeat with as good a grace as if it were a victory; to laugh instead of weep; to be one with nature in all her myriad moods, and to enter wholly into the great scheme of the universe of which you are such an infinitesimal part—all of this is fun—real fun. And it is fun that is profitable.

C. H. Johnson,

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The Principles and Technique of Casting

PRESENTED AT ONTARIO DENTAL ASSOCIATION CONVENTION,
MAY, 1924, BY CROWN AND BRIDGE STUDY GROUP OF
THE TORONTO ACADEMY OF DENTISTRY.

I. H. ANTE, D.D.S.

Professor, Crown and Bridge, Royal College of Dental Surgeons.

ASSISTED BY

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A. B. BABCOCK, D.D.S.; HARRY SMITH, D.D.S.; A. M. HORD,
D.D.S., AND F. L. COLE, D.D.S.

CASTING (WAX).

ONE of the chief advantages of the casting process lies in the fact that small as well as large units may be formed in wax and cast in one operation with precision and accuracy sufficient for most practical purposes in Dentistry. Another and most valuable property made possible by this process is the retention of form, the finished structure being better distributed, a condition seldom if ever attained when building up with gold plate, wire and solder.

Just as the casting process has many possibilities, so it has many limitations. Absolute precision of adaptation is impossible, principally because of the shrinkage of gold, which while negligible in inlays, etc., is very apparent and detrimental in the construction of cast $\frac{3}{4}$ crowns and similar work where the least defect in adaptation spells *failure*.

We are now able to make inlays so nearly perfect as to satisfy the most critical. However, accurate and dependable gold casting presents many problems in addition to those of a metallurgical nature. Consideration must be given to the behavior of investment materials under various thermal conditions, the various methods of melting and casting, as well as to the deoxidation of the alloys employed and the final treatment of the castings; special attention must be paid to the wax employed, because of its high co-efficient of expansion and contraction when subjected to changes of temperature, also to various methods of clearing the mold, as the accuracy of the mold, resulting from the wax pattern, is directly responsible for the accuracy of the casting.

Inlays to be properly adapted to the walls, margins and gingival seats of cavities in teeth must be more precise, and, therefore, are more difficult to construct and adapt accurately than any other form of casting. The tooth which is to receive the inlay does not yield and

conform itself to inaccuracies, whereas saddles and partial or full plates, even if slightly inaccurate, are easily and satisfactorily adapted to the mucosa which does yield and conform itself to slight imperfections.

Technique may vary in the hands of different individuals under different conditions, but principles do not vary; they guide, direct and control technique.

CHARACTERISTICS OF WAX.

One of the greatest difficulties in the making of accurate wax patterns, especially for inlay work in which the utmost precision is essential, results from the instability or change of form and volume of so-called inlay waxes, which are composed of various proportions of organic and vegetable products; the compounds of paraffin, resin, carnauba, bayberry, beeswax, etc., employed for the purpose, are extremely variable in composition and physical properties. The waxes employed may be divided into three groups; hard, medium and soft.

Those of the first group are of the very hardest type; are entirely non-plastic at body temperature, fracture easily when bent or compressed in the cold state, flake badly unless manipulated at a very high temperature, are difficult to unite or weld when broken, having little or no adhesive properties, and are much more liable to distort and shrink upon temperature changes than the waxes in the other groups. It might also be added that they remain plastic longer upon heating than those in the following group.

The medium hard waxes in the next group are also non-plastic at body temperature. They soften at a lower temperature than the very hard waxes, are slightly more adhesive, hence, weld more readily, flake less, and are generally easier to manipulate. They distort and shrink less than those of the first group, also melt, carbonize and volatilize at lower temperatures. Clinical experience has indicated that in temperate climates these waxes are more suitable than those of the very hardest type for inlay work in general, both for the direct and indirect method. They soften at 115 to 130° F. and melt at about 150° F.

In the third group, soft or comparatively soft waxes, may be included a number of so-called inlay waxes which are entirely unfit for inlay use, even outside of the mouth, because they are not rigid enough even at room temperature to maintain delicate margins for inlay work. In this group may also be included the waxes furnished in sheet form, for casting saddles, plates, etc. These are very plastic and easily adapted, and as they are warmed but slightly to secure adaptation, the range of distortion is so low as to be practically negligible, especially when chilled under pressure. They soften at body temperature and melt at about 110° F.

It is claimed that casting wax has a co-efficient of expansion of

one per cent. for every 20° F. in rise of temperature. If this is true, then, the co-efficient of contraction being equal to the co-efficient of expansion, we have a volume change of approximately two and one half per cent. between the temperature at which the wax is heated, namely, 130° F., and the open mouth temperature of 80° F., to which the wax is chilled. Our great problem is to know how much shrinkage we have to contend with, when this expansion and contraction is completed, and how best we may minimize same.

Wax heated over an open flame and the surface allowed to flow is apt to become brittle and flaky; also, the theory advanced is that dry heat extracts the oil of paraffin, which is a most needed element, and the expansion of the wax is raised to the maximum.

While it is claimed that most of the inlay waxes volatilize completely, leaving no residue in the mold, it is unfortunately true that many of them, no matter how highly heated, leave a residue of unconsumed ash which deposits in various parts of the mold, occupying space and thus causing defects or pin holes in the casting. Therefore care must be exercised in the selection and testing of the different waxes to be employed.

The organic and vegetable products of a wax when burned out leave a carbonous residue upon the surface of the mold which acts in a double capacity, as a deoxidizing agent and as a flux for the gold, and the amount is determined according to the amount of heat applied.

Heating to 500° F. and over decarbonizes the wax, producing in the mold dark brown residue; light brown residue at 600° F.; and volatilized or eliminated at 700° F. and over.

Heat not to exceed 350 to 400° F., or low heat technique, the wax is absorbed into the investment and carbonized, producing a hard black surface on the inside of the investment which gives a burnished casting.

Eliminate wax by steaming through sprue hole, and boiling out with boiling water, then heating, are both for low heat technique, 350°.

Just as the various types of waxes differ in melting point and hardness, so do they differ in the temperature required to carbonize, decarbonize, and volatilize. This must be borne in mind in connection with the various methods of removing the wax pattern from the mold, because, whichever method is adopted, the type of wax selected must be adhered to for the particular method and not changed without proper temperature readjustment in the heating of molds.

It is unquestionably true that shrinkage in castings (usually laid to investing, burning out or shrinkage of gold,) is often due to faulty manipulation of wax preliminary to making the pattern.

A knowledge of the characteristics and working range of the wax employed is essential to its proper manipulation for obtaining a good impression.

Wax in the shape of cones is probably the most convenient form for inlay work. These cones can be obtained in several sizes. Each cone contains sufficient wax for a single impression. Wax molded in stick form is also popular.

To soften wax, immerse in warm water of the temperature required for the wax used. The temperature requirements will vary according to the composition of the different waxes, and to meet individual ideas as to the proper consistency for molding. Accurate adherence to the temperature determined as best for the wax used insures maximum moldability.

The wax is placed in water at about 125° F.; when sufficiently plastic remove and dip tip of cone into the flame to soften the tip and use the hard end as a plunger to force the soft wax into every part of the cavity.

Now insert the wax and apply pressure *in one direction constantly*, always at right angles to gingival seat, for one minute. At the end of this period the wax will have ceased to "crawl" under pressure.

Chill with room temperature water, remove pattern from cavity and examine in detail all seating surfaces and margins to see that the outline is sharp.

Waxes. The better combinations of waxes may differ in hardness and elasticity, but when manipulated they exhibit certain physical characteristics common to all waxes, namely, expansion, contraction and elasticity.

The following techniques to compensate for the physical characteristics of the wax pattern are recommended:

(A) Thoroughly chill the wax and remove from the cavity. Then soften all cavo-surfaces by dropping hot water on them. Lubricate the cavity, preferably with warm water, and again press to place for one minute. Or:

(B) Add softened wax of the same formula to dry surface of the gingival seat of the pattern.

Soften cavo-surfaces and all margins with hot spatula and apply pressure for one minute.

For a compound cavity use a matrix band to prevent the wax from crawling away from the gingival seats; by the use of sharp curved cutting instruments, the wax may be cut and shaped off, buccally and lingually, always cutting as much as possible towards the margins, by this means accomplishing a certain amount of burnishing.

If difficulty is experienced in polishing the mesial and distal surfaces of the pattern at the gingival margin, a strip of very thin satin or China silk can be used to good advantage. The materials have the proper qualities to pick up surface flakes, polish, remove overhang, and to reach angles which are difficult to approach with an instrument without damage to the margins.

Also with the China silk strip, passed through the interproximal

spaces and around the tooth, the ends held firmly at the buccal or labial and the wax pattern pressed firmly in its position while "pull" is exerted on the strip, the wax pattern will be adapted to the axial walls of the cavity and any distortion corrected.

Remove wax matrix from out of the cavity, with point of explorer placed in palm of hand. Heat sprue wire of suitable size and insert into greatest bulk of the wax, where it will least defect detail and most facilitate the entrance of the gold to all accesses of the mold and in a position so that all of the wax is in advance of the sprue.

TAPERED SPRUES ARE ADVISABLE.

Sprue pins of different sizes, graduated as follows, have been used successfully and give best results by minimizing the contraction of the gold in the inlay.

Size of casting $\frac{1}{4}$ dwt. 20 gauge sprue; $\frac{1}{2}$ dwt. 18 gauge; 1 dwt. 16 gauge; 2-3 dwt. 14 gauge; 5 dwt. 12 gauge.

Place in water of room temperature in different colored medicine glasses, the color of the glass to designate the metal to be employed for casting.

For casting small restorations such as inlays, crowns, clasps, etc., the distance from crucible to wax pattern (length of the sprue) should not exceed one-fourth inch (preference given to a length of three-sixteenths inch). A longer sprue hole in a cold mold will often result in an incomplete casting, because the gold may become sluggish before reaching the mold. The distance of the wax pattern from the end of the ring should not be over $\frac{1}{4}$ of an inch to allow for free escape of oil or gases through the investment.

INVESTMENT COMPOUNDS FOR CASTING.

The materials employed for molds in casting operations consist almost invariably of plaster of Paris and silica; the plaster of Paris serves as a binder or cement, holding together the particles of silica which constitute the filler, and prevents shrinkage of the mass, or induces expansion, depending on the proportions and thermal conditions.

The greater proportion of plaster in the investment, the smoother will be the casting, but the more liable to check under excessive heats. Inversely so, the greater the silex element, the greater the heat resisting properties, but the more porous the investments and the rougher the castings.

Plaster of Paris is prepared by slowly heating the native gypsum sufficiently to drive off the first molecule of water of crystallization, which begins to be given off at 175° F. and is entirely eliminated at 260° F., then grinding the gypsum to plastic powder. The user adds again the molecule of water of crystallization, together with free water, and re-crystallization takes place, forming set plaster.

Plaster shrinks very considerably upon heating, especially beyond 400° F. Furthermore, the numerous grades on the market vary considerably in fineness, setting time and hardness, also to some extent in degree of shrinkage upon the application of heat.

Plaster disintegrates at 375° F. and assumes a dry powdery form entirely unfit for casting into, and is therefore the weakest and most dangerous of investment ingredients. However, when combined in proper proportions with silex, marble dust, graphite, etc., its heat resisting qualities are raised sufficiently to withstand the burning out of the wax.

Therefore the plaster content of an investment must be varied to suit the method employed, the degree of heat applied, and the time of its application.

Silica or silex is the commercial or trade name applied to the finer grades of crushed quartz, flint, sand, etc., all of which are quite similar in chemical composition (SiO_2), but vary in the amount of impurities contained. The best type of silica for investment compounds is of the crystalline variety, as it expands to a comparatively high degree upon the application of heat (400° F. and above); whereas other silicas (known as diatomaceous earth) are lower in specific gravity and possess little or no expansion; they often contain a high percentage of impurities, and shrink greatly upon heating.

Nearly all the investment compounds on the market are claimed to neither expand nor contract. This statement is very *misleading*, as most of them shrink very considerably upon heating, and this accounts for much of the *inaccuracy* in casting and soldering operations.

The plaster and fine silica control the degree of smoothness of the surface of the mold, hence the addition of any material such as graphite, has little or no influence in making a smooth mold, and is objectionable because it floats in water and retains air; the mixing of the investment must be prolonged on that account. The graphite compounds are usually made with *retarded* plaster, which is also objectionable.

Another factor which directly controls the smoothness of the casting is the temperature that the mold is heated to and the temperature of the mold at the time the gold enters it. The theory that a mold when heated is enlarged by the expansion, to compensate for shrinkage of the gold in cooling, is correct theoretically, but it does not work out in the case of casting. While an investment for casting may be formulated so that it will expand upon heating, the investments generally employed do not expand, but shrink so much upon being subjected to high heat that an actual contraction as well as a distortion of the surface of the mold takes place and the resultant casting is distorted or warped; hence casting into an excessively hot mold is not advisable with any investment, even when of the expanding type.

1.—*Low Plaster Content* for low, high or medium heat technique.

These compounds consist of 25 to 30 per cent. plaster and 70 per cent. to 75 per cent. silica. They may be subjected to as high a temperature as 1300° F. without any shrinkage, but they begin to deteriorate in other ways after 500° F. The weakening of the mass and loss of smooth surface becomes more pronounced after 800° F. has been reached, hence investments of this type should not be subjected to a temperature of more than 1000° F. at any time, neither should they be heated for a long period (over 1 to 1¼ hours). Also prolonged heating of 3 or 4 hours at a lower temperature such as 600° F. produces just as deleterious an effect as a shorter period of heating at a higher temperature; heating for 2 hours, and not over 800° F., is sufficient for any mold.

Molds made from investments of this type depend for smoothness upon the impregnation of the investment walls surrounding the pattern, with the wax employed for the pattern, and excessive heating is contraindicated, as a carbon residue of film is formed on the inside of the pattern chamber, which produces smoother castings than by completely volatilizing the wax. Investments of this type must be heated moderately during the preliminary stages of drying to retain the wax in the pattern chamber and thus assure the necessary impregnation. Low heat 150° for 30 minutes and 600-800° for 60 minutes, or low heat 150° for 30 minutes and 350-400° for 60 minutes, for average size inlay ring.

2.—*High Plaster Content*: This type of investment, containing 45 per cent. to 50 per cent. of plaster, was developed primarily to provide a compound with a higher plaster content than the investments previously described, to provide a harder material for such purposes as models upon which patterns for cast clasps, saddles, etc., may be waxed up for casting directly on the model. An investment of this character is considerably harder than one with a higher silica content, and possesses sufficient strength so that it may be safely separated from plaster or modelling compound impressions. Containing a higher percentage of plaster, it is somewhat denser than the other investments, and presents a smoother surface, which is not affected by contact with moisture, or even boiling water. An investment of this type must necessarily contract upon being subjected to high heat, but when subjected to temperatures below red heat shrinks so little that the slight discrepancy due to the shrinkage of the investment is negligible.

A compound of this type undergoes no surface deterioration upon being subjected to the heat of boiling water, which makes it possible to employ it as an investment for inlays and similar work where the pattern is removed by boiling out the wax pattern from the mold, instead of impregnating the investment with wax and partially or completely volatilizing the carbon residue. An investment of this type may be employed to advantage in inlay work. It shows absolutely

no shrinkage upon heating at temperatures below 450° F. It may be subjected to this temperature for an hour without deterioration, or to a lower temperature such as 350° F. for two hours.

A high plaster content is absolutely essential to the quick carbonization method, sometimes called "boiling out" technique (Knapp). This method requires an investment that will "set" thoroughly and quickly (15 minutes). It must set *thoroughly* to withstand the strain of rapid forcing out of the wax. It must set *quickly* in order to retain the free moisture to assist in washing out the wax when the high heat is suddenly applied.

A high plaster content investment burned out with high or medium heat carbonization technique, will crack, shrink and disintegrate the mold to a greater or less extent, but if a low heat is employed, as 150° F, for 30 minutes and 350-400 for 1 hour, and not over 2 hours, it remains considerably harder than one of the low plaster content type, and does not crack, shrink or disintegrate, hence is better able to resist excessive pressure when applied in casting, and produces most excellent results.

3.—*Medium Plaster Content*: There are a number of compounds containing approximately 35-40 per cent. plaster on the market. The behavior of these compounds is rather unsatisfactory and extremely undependable unless employed under exact temperature control. They do not contract below 700° F. unless the heating is protracted, but as this is a critical temperature in the process of burning out patterns, the use of this type of investment is inadvisable unless used in the low heat technique, as there is not sufficient leeway to permit the necessary elevation of temperature, which is liable to occur with uncontrolled heating devices.

It is advisable to employ the low plaster content investment for casting operations such as saddles, full gold or aluminum base, etc., where it is essential to cast into a hot mold which facilitates the flow of the gold over very thin surface and large area; and the high plaster content investment for those casting operations for which it is especially adapted, as models for clasps or saddles, cast crowns, three-quarter crowns, inlays and small castings in general.

INVESTING WAX PATTERN.

Wax patterns made in the mouth are considerably distorted by transferring from mouth temperature to room temperature. A still further, and even greater, contraction takes place when they are invested in compound mixed with water at hydrant or tap temperature. Whether this is done immediately upon removal from the mouth or some hours later is practically immaterial. If a pattern in the cavity of a tooth in the mouth is accurate in dimension at mouth temperature, then it surely cannot retain this dimension if removed from the mouth and subjected to a material temperature change.

Hence to maintain its exact dimension, the investment material and all apparatus should be room temperature or above. If the investment can be worked at mouth temperature all shrinkage of the wax pattern will be avoided, as this will serve to expand the pattern slightly and thereby aid in compensating for the contraction of the wax and gold.

Mount the inlay and sprue on the oiled crucible former of proper design for particular type of casting machine to be used; cone shape for centrifugal machines when gold is thrown, saucer shape for all other designs. Examine wax with a magnifying glass to make sure that no margins have been bent or marred, also that there are no adherent flakes or shavings of wax.

Before each mix, thoroughly stir the investment in the box or can. The heavier ingredients tend to settle to the bottom from the shaking up in transportation or other jarring of the package.

For all techniques given herein, nine parts of water to a *minimum* of sixteen parts of investment by weight is recommended. Uniformity of mixes is assured by weighing on an accurate scale. *Correct proportion and uniform mixes* are assured through use of the Heidbrink Scale (Taggart Scale 5 drams water) or Dental Products Scale.

Use *distilled* water. *Beware of alkaline water* which hastens the setting of the mix sufficiently to interfere with proper working of the investment.

With hand spatula use a large rubber bowl (at least 4½-inch diameter) and medium rubber spatula curved to conform to the bowl bottom. Keep them scrupulously clean and use them for no other purpose. Wet the inside of the bowl and wipe out with a towel before using.

Thoroughly *spatulate* the mix by rotating the bowl and flowing the investment beneath the spatula to remove the air from the mix and until a creamy consistency is reached. *Do not stir*, but rotate bowl for high plaster content 15-20 seconds, low plaster content 30-35 seconds, not longer.

For painting the wax pattern a No. 2 or No. 3 Red Sable or Ox Hair Art Brush is most suitable. The hairs of these brushes will not spread and introduce air bubbles on the surface of the pattern. *Flow* the investment rather than paint it on. While the investment is thin, cover seating surface first, contact point of sprue pin second, and outside surfaces last. Pour the mix into the ring (the inside of which should be moist but not wet), filling same, and insert the painted inlay down into the investment contained in the ring. If the mix is properly timed the investment is as thick as is possible to pour but not so thick that it must be helped into the ring with the spatula or the fingers. Water showing on top of the mix, or around the base of the flask after pouring, indicates the presence of too much water or poor spatulation. Such a mix when "burned out" usually results

in a cracked mold and castings that have rough surfaces and feather-edged margins.

If after painting the pattern a mix "sets" too fast to be poured easily, thoroughly clean the pattern with room temperature water and start from the beginning with a new mix. A knowledge of the working range of the investment used and a *clean bowl and spatula* will assist greatly in eliminating this difficulty.

Slightly oiling the sprue base insures its removal without sticking. Remove base when the investment is hard enough to cut (30 minutes). Heat the sprue pin slightly before removing, and use great care, as the pattern is imbedded in investment that has hardened but little. In all except the Quick Carbonization technique, allow the mold to stand and crystallize—minimum one hour, maximum two hours.

Crystallization is the "setting" of the investment which takes place during standing time before "burning out." Much discussion has arisen as to the length of time required for proper crystallization of a mold.

To insure best results, no mold which has not been allowed to stand and crystallize for a minimum time of one hour should be submitted to either the Low or the High Heat Carbonization techniques. Also, no mold should be permitted to crystallize for over two hours.

WAX ELIMINATION.

Probably the most abused step in the casting process is the application of heat in "burning out." In all but the Quick Carbonization Method, after the mold is allowed to crystallize, heat should be applied gradually with a slow, even rise until the mold stops smoking. This gradual application of heat can best be accomplished by an electrically controlled oven, or a gas oven.

The use of proper heating apparatus is highly essential, and it is unfortunate that this important step in the procedure is often performed in a careless and inefficient manner. The appliances generally employed for this purpose are crude and inefficient, principally because the heat obtained, while ample, cannot be definitely controlled and applied.

The importance of the proper application of heat in the High, Medium or Low Heat Carbonization Method is shown by a review of what actually occurs during the "burning out" of a mold. There are three stages in the process. Successfully accomplished they are:

First: Driving of the moisture in the investment without exploding the mold or boiling the wax.

Second: Melting of the wax and its proper distribution throughout the investment.

Third: Burning out of all organic matter and combustible gases, with the minimum loss of investment strength and with a *retention of carbonous residue as an infinitely thin lining of the mold.*

Some discussion has arisen regarding the desirability of a carbonous film or lining in the mold. That its function may be better understood, let us consider the characteristics and actions of this residue. It is a well-known fact that inlay waxes contain only organic and vegetable substances. Therefore, the only kind of carbon dealt with in the casting process is *amorphous carbon*.

Amorphous Carbon in the presence of heat combines with oxygen to form carbon dioxide. Therefore, when the hot gold, to some extent oxidized, strikes the carbon film, *the oxides and the carbon form carbon dioxide which is forced out through the pores of the mold. The carbon film disappears as a gas*, taking with it some of the surface oxides of the gold and leaving the walls of the mold clean. *If carbonization has been complete there is nothing left to prevent gold from occupying the final marginal recesses.* (References: Remsen's Chemistry.)

This, then, should definitely dispose of the theory that the carbon film occupies space and prevents the entrance of the gold to the marginal recesses of the mold.

The retention of the carbonous residue or film in the mold is essential, because it accomplishes the two things which are highly desirable and which cannot be accomplished in any other way, viz.: it acts as a deoxidizing agent and as a flux for the gold. *The burning out should be so regulated that this carbon film or residue is preserved.*

In the boiling out method the process followed is identical so far as the treatment of the pattern prior to investing is concerned, but the investment employed must be of the *high plaster type*, the mixing, painting the pattern, filling the flask, etc., being done in exactly the same manner as previously described. After the investment has set for one hour, and the crucible former removed, the mold is laid on its side in a pan of boiling water and kept there for two or three minutes (or longer) until it is evident that the wax has come out. There should be sufficient water in the pan so that the mold is well submerged. The water must be *boiling* when the operation is started, and *kept boiling* but not hard; keep it just to the boiling point.

The temperature of the water can be increased considerably by the addition of some salt or soda or a small quantity of sulphuric acid. The boiling process removes the entire pattern with the exception of a slight film of wax which adheres to the walls of the pattern chamber, and which is decarbonized upon drying. As there is practically no wax present in the mold, the drying must be done at a lower temperature; as the investment contains a high percentage of plaster, 150° F. for a period of 30 minutes; 350 to 400° F. for a period of 30 minutes (if heating device is of the closed chamber variety).

This method of removing the wax seems to offer great possibilities, principally because it permits the employment of a harder investment than otherwise. Furthermore, the investment is not materially deter-

iorated by the comparatively low heat to which it is subjected, and the mold resulting therefrom is much better able to resist even excessive pressure at the time of casting. Most excellent results can be obtained with this method, hence I do not hesitate to recommend it, not only for inlays but for all sorts of small castings. It must be remembered, however, that *definitely controlled and applied heat* in the drying molds for this method is even more important than for other methods.

LOW HEAT TECHNIQUE.

Any Casting Machine, any Investment, any Wax, Investment proportions 16 parts Investment (minimum) to 9 parts Water (by weight); Crystallization of Mold, minimum 1 hour, maximum 2 hours.

Place molds (*sprue holes up*) in cold oven, leave cover off and turn on low heat, 150°F. for 30 minutes; place cover on and increase heat to 350°F. for one-half to one hour. Then examine molds *as they stop smoking*, remove them from the oven. **THIS IS THE ONLY FOOL-PROOF TECHNIQUE.** It produces a mold with minimum shrinkage and distortion and of maximum resistance to the heat and stress of casting. It thereby allows latitude for obtaining workable castings from molds somewhat defective because of someone's failure to properly carry out some step in mold production. Molds "burned out" by this technique may be cast immediately without waiting for them to cool.

Nothing is gained by permitting the investment to cool when the low heat technique is used; if anything, it is *detrimental to the investment* if it is permitted to cool and then reheated, as it must be when the gold is melted on the surface of the investment, and especially when artificial gas and air are employed, as it takes longer to bring the gold to a proper state of fluidity with so-called "cold mold" than with a so-called "hot mold," hence nothing is gained. However, usually better castings will be obtained by reducing mold expansion by cooling, if high heat technique is employed, and using any type of centrifugal casting machine where the gold is melted in a crucible and not on the investment containing the inlay form.

Molten metal cast in a cold mold chills quickly, which interrupts crystal growth, thus producing small structures with maximum physical properties.

Slow cooling *develops* crystals. Also it has been proved that much crystal growth occurs after the metal has solidified and while cooling.

Therefore we recommend low heat technique and immediate casting, or high heat technique and allowing mold to cool.

CASTING MACHINES.

Since the introduction of casting several types of apparatus have been devised. While the results obtained with some have been

excellent, no type of apparatus so far has excelled the air or gas pressure machine.

The air or gas pressure is definitely controlled, sustained and applied as slowly or rapidly as may be required after the packing has come definitely in contact with the upper part of the flask, seating it and forcing the air or gas directly on the molten gold.

The air pressure apparatus has a larger capacity and may be used to advantage in the production of large as well as small castings.

"Vacuum" casting machines. These, while very numerous, probably in excess of all other types combined, and capable of producing good results if properly operated, easily get out of order because of leaky valves, pumps, etc., or through neglect to maintain a perfectly ground and polished surface on the bed plate and the casting ring, which must make a perfect contact in order to prevent leakage. In the majority of cases the vacuum is maintained for an insufficient time, due to leakage of the machine, or leakage between the bottom of the ring and the bed plate, or leakage due to shrinkage of investment; any of which prevent the maintenance of the vacuum and cause the loss of pressure which should be sustained during the period required for the congealing of the gold. This usually results in separation of the casting from the button, deficiency of the casting at that point, and still worse, rounded and deficient margins.

In spite of the general defects and disadvantages of the vacuum type of machine, very good castings can be made if the apparatus is in good order and the bed plate and flask are carefully reground and polished each time before they are used, to maintain a perfect seal; another precaution that must be taken is the use of an investment compound that will not shrink and leave a space between it and the walls of the ring. A quantity of gold sufficient to leave a residue button of not less than $2\frac{1}{2}$ to 3 dwts. should be used. Furthermore, the blowpipe flame must be removed instantly upon turning the valve and admitting the gold. A flanged clay cup or crucible, which covers the upper part of the flask and becomes practically a part of the investment, materially prevents the rapid passage of air through the investment, thus making possible a longer maintenance of the vacuum.

Centrifugal casting machines of various types are almost as numerous as those of the vacuum type, and while not as reliable and desirable as controlled air pressure machines, are capable of producing good results. The principal objection to some of the centrifugal casting machines is the fact that the gold enters the mold with great initial velocity, and the mold is liable to be distorted. As the velocity decreases, so does the pressure, and practically the same effects result as in the case of the vacuum casting machine.

Another type of apparatus, the steam pressure casting machine,

which may be anything from a simple, home-made device to an elaborate device, is extremely unreliable but should be mentioned because it is extensively employed. In using such a device, dependence is placed upon the formation of steam through contact of moistened asbestos or putty with the molten gold, or hot casting ring and investment, the steam thus formed serving as the force to drive the gold into the mold. I cannot help voicing a most emphatic disapproval of this method, in spite of the fact that good work has been accomplished by it.

Very often insufficient force is produced, resulting in a complete failure to cast; at other times only a partial casting results, either for the same reason, or because the pressure is not sustained; on the other hand, excessive pressure is often produced which cannot be controlled, and in any event the pressure, even if obtained, cannot be sustained.

The percentage of successful, or reasonably successful, castings with this type of apparatus is considerably less than with even the vacuum and centrifugal machines, and unless one is especially adept and willing to take chances on "make-over," he will do well to avoid the use of such unreliable methods, especially if his time is valuable.

I do not intend to imply that good work cannot be accomplished with other types of apparatus than the controlled and sustained air pressure casting machine, as this would be untrue. However, my firm belief is that the best results obtained with the other machines are due in a great measure to the skill and carefulness of the operators; also to the fact that the investments employed are not abused in heating as much as in the past, which makes possible molds not so seriously weakened or disintegrated; hence, capable of resisting higher initial pressures than otherwise. Furthermore, better alloys and methods of melting are responsible too. Operations in order to be valuable must be capable of repetition, and no type of apparatus that I personally know of will do this as well as the controlled and sustained air pressure machine.

MELTING THE GOLD.

Gold alloys for casting inlays to serve as attachments for bridge-work, clasps, sections of bridge-work, plates, etc., must necessarily contain a considerable percentage of copper, which serves as the main hardening agent, platinum being secondary and palladium negligible in that respect, but necessary to restore the melting point and prevent the segregation of the copper, thereby maintaining the stability of the alloy. Even with the proper addition of modifying agents (other metals), the copper oxidizes more or less during the melting of the alloy, depending upon the character and duration of the heat employed, and enters the mold in a partly oxidized state. The object,

therefore, is to maintain the gold in a reduced form (metallic) and not in an oxidized state at the time it enters the mold.

Please remember that oxides do *not* alloy with metals. They penetrate the mass and remain in suspensions. *Many casting failures are caused by oxidation.*

Oxidation is caused largely by the use of an oxidizing flame and the absence of reducing flux. It is therefore necessary that extreme care be exercised in working out the technique of melting gold to a point where you can be reasonably sure of the fact that you are using a neutral or reducing flame.

With the city gas and air flame, which is probably the most generally used, and by using the neutral flame, it provides the best results. The neutral flame has a blue cone which indicates complete combustion of gas and air.

The oxidizing flame is caused by an excess of oxygen or air. This flame can be identified by the fact that it is a purplish blue cone, slightly yellow towards the tip, and throws off red sparks, which indicate an excess of oxygen that is not burned and is thrown in contact with the molten mass. Avoid the use of a flame of this character, as it is an oxidizing agent and contributes largely towards disappointing results. It is well to keep gold covered with blow-pipe flame to exclude air while melting.

Overheating has probably ruined as many, if not more, castings than any other mistake that can be made in the casting technique, but *the greater danger lies in too little heat, or rather too prolonged melting.*

It is well to remember that the hotter the gold becomes, the greater tendency it has to absorb and retain oxides, which in itself is sufficient reason to guard against it.

Another very important reason for condemning overheating or prolonged heating is due to the fact that the smoothness of the casting is dependent to a very large extent upon the casting temperature. The temperature of the metal at the time of casting must neither be too high nor too low. When the metal is at white heat and spluttering, it is too hot. It is important, however, that care be exercised not to attempt casting without being sure that the entire mass is in a molten or liquid condition. This determination can be made by watching the metal carefully until the scum breaks, producing a mirror-like surface. It is very easy to determine at this point whether the mass is all molten or not by whipping the blow-pipe flame over the mass. When a mirror-like surface is observed and you have determined that the mass is all molten, the casting operation should, immediately be performed!

An inlay cast with gold insufficiently fluid cannot have the fine marginal detail which is so highly essential. On the other hand, an

inlay cast with superheated gold can never be right, because the gold fuses with the investment surface on the interior of the pattern chamber, and, entering under pressure, impregnates the pores of the mold. The result is a casting so rough as to be apparent even to the naked eye; the resulting discrepancy prevents seating of the inlay.

High fusing golds pass through five visible stages before reaching proper fluidity for casting:

1. Forms into button.
2. Turns a cherry red in color.
3. Becomes spheroidal in shape.
4. Quivers under pressure of the blowpipe.

Caution.

5. Approaches a white heat.

Danger.

6. White heat, boiling and spitting of fine particles from the mass.

High fusing golds should be cast *just before* the fifth stage is reached; other golds at the fourth stage.

To carry gold beyond the fifth stage will destroy its usefulness for casting until it has been refined.

Quantity of Gold: An adequate quantity of gold must always be employed in casting operations, not only because oxidation during melting is reduced as the volume of metal is increased, but also because an adequate excess facilitates the concentration of pressure over the sprue hole and thereby the production of a denser and better defined casting. For small castings, such as inlays, an excess of approximately 3 dwt. should be employed.

New unused gold is best for casting purposes.

Gold melted repeatedly accumulates oxides, which cause the metal to deteriorate and exhibit brittle tendencies. *Therefore no melt* should contain less than 50 per cent. new unused gold.

Impurities in casting golds are responsible for many casting failures. Scrap gold containing traces of solder should never be used.

Do not "flux" gold while heating it in the crucible for casting. Very often some of the flux is carried into the mold along with the gold, and causes incomplete castings.

With pressure machines avoid the use of more pressure than is needed for casting. Too much pressure produces distorted castings with feather edges and rough surfaces. For castings up to three dwt. the pressure should be sustained about two minutes. Without sustained pressure, castings may be incomplete, lack detail, and separate from the sprue.

With centrifugal machines, adjust the speed to produce *only the required casting force*, and sustain it for at least one minute.

With vacuum machines, occasionally test for leakage by tying a

piece of rubber dam over the ring seat. Any leak which sustains suction force on the mold *while the gold is being fused* may draw some of the gold into the sprue hole, where it will chill and block the opening into the mold.

Chilling or Quenching: It is well to mention here that in no case should casting golds or clasp metals containing platinum be chilled at red heat. The character of these metals seems to repel so great a shock, because undue brittleness, cracks and, in some cases, breakage results.

From the results of tests shown it is quite obvious that we are right in drawing the conclusion that casting into a warm mold and chilling after about thirty seconds have elapsed should provide the most excellent physical condition for your castings, and safeguards the technician against undue brittleness. It produces a tough, strong and elastic casting with just enough ductility to prevent breakage.

Pickling by the method commonly followed is best accomplished by heating the casting until it shows slightly red and dropping it into 25 to 50 per cent. Sulphuric Acid solution.

All highly alloyed golds such as used in clasps, bridge abutments with clasps, and other castings where spring and hardness are to be retained, after pickling heat the casting to a dull cherry red and allow to cool slowly in the open, then boil in acid 25 per cent. Hydrochloric.

Another Treatment of Castings: Castings upon removal from the investment must be thoroughly cleansed from adherent particles of investment (visible and invisible), which prevent accurate adaptation and interfere with soldering, if this is to be done subsequently. The best and probably only method of thoroughly removing the adherent investment is by the use of hydrofluoric acid, which dissolves plaster, silica and similar substances quite rapidly and thoroughly.

Acids such as hydrochloric and sulphuric do not dissolve silica, but they may be employed in a secondary capacity to thoroughly remove the traces of hydrofluoric acid. The work should be permitted to remain in hydrofluoric acid for 15 to 20 minutes, then removed, dipped in sodium carbonate solution, rinsed in water and boiled in dilute hydrochloric or sulphuric acid, then neutralized in sodium carbonate solution and rinsed in water to remove the soda. Then, and then only, is the work really clean and suitable for handling in subsequent operations. Hydrofluoric acid is, of course, a very dangerous and objectionable material to handle and precaution should be taken to prevent contact with the hands.

Treatment of Residue Buttons. Residue buttons of casting gold, containing considerable alloy, should always be remelted in charcoal with "reducing" flux prior to subsequent use. After melting, the button should be permitted to solidify on the charcoal, but removed before it is cold (while still red) and dropped into dilute hydrochloric or sulphuric acid.

Residue buttons, unless very badly contaminated or much deteriorated by excessive melting, need not be discarded. Treatment with "reducing" flux and the continual addition of fresh gold (50 per cent.) is sufficient.

The problem of liquefying casting gold (pure or alloyed) to the *proper degree* is not simple, because it is very difficult to repeat these, comparatively speaking, minute operations and to obtain the same result every time. The following table indicates the various gases employed and the approximate temperatures attained in the melting of casting gold under working conditions.

"Low" Temperatures.		App. Degs. F.
Artificial gas and compressed air		2200-2500
Natural gas and compressed air		2000-2200
Gasoline and compressed air		2100-2300
"Moderate" Temperatures.		
Acetylene gas and compressed air		2500-2800
Hydrogen gas and compressed air		2600-2900
"High" Temperatures.		
Artificial gas and nitrous oxide		3300-3600
Hydrogen gas and nitrous oxide		3500-3800
Natural gas and oxygen		3100-3400

Low Temperatures: In this group may be placed artificial gas, natural gas and gasoline gas. Artificial gas, while undoubtedly superior in caloric values and much easier to employ than the others, is unfortunately not available in all communities; hence, those who are unable to use it are laboring under a serious disadvantage. While natural or gasoline gas are fairly capable of producing the necessary heat for ordinary soldering operations, both are not only generally inefficient but at times are entirely incapable of producing the necessary heat to melt casting gold, even to a lower melting point than pure gold.

Artificial gas with compressed air unquestionably provides the safest, most easily controlled and most dependable fuel for general casting and soldering operations. The special advantage of this fuel is in the fact that while ample heat may be attained for all necessary operations, if an efficient blowpipe is used, it is impossible to attain "high" or "excessive" temperatures and thus superheat casting gold or overheat and endanger delicate parts in the process of soldering; thence, it should be employed in soldering and casting operations, whenever available.

Moderate temperatures: Acetylene gas with compressed air produces greater heat than artificial gas and is employed usually in localities where artificial gas is not available, and natural gas or gasoline is incapable of producing the required heat. The acetylene flame, however, affects alloys very unfavorably, forming carbides with

copper, platinum, etc., and the results are usually very poor. There is evidently insufficient oxygen in the compressed air to neutralize the carbon freed in the burning of the acetylene, and a more neutral flame can be obtained with oxygen and acetylene than with air and acetylene, but the temperature attained by this means is so excessive as to be positively dangerous and should not be employed with either alloyed or pure gold, if the latter is used, as superheated pure gold is just as much to be avoided as any other superheated gold, if smooth, accurate castings are desired.

Hydrogen gas is unquestionably the ideal fuel in communities where artificial gas is not available; while the temperature attained is considerably higher than is possible with artificial gas and air, it is so easily controlled and maintained by adjusting the air pressure that the danger of any overheating is negligible. In casting, the higher heat attained is highly advantageous, as the gold can be melted more rapidly than with artificial gas and compressed air. Another special advantage of hydrogen gas over other gases is in the fact that with it a "reducing" flame may be produced much more easily, which is highly desirable for all melting operations, whether for casting or soldering.

High Temperatures.—Theoretically, high temperatures, such as produced by artificial gas and nitrous oxide or hydrogen gas and nitrous oxide, are preferable to lower temperatures for melting operations in connection with casting, when it is desired to bring gold to a state of fluidity very rapidly. If this is done without superheating the gold, it is unquestionably the ideal method, and it can be accomplished with proper controlling apparatus. The same applies to hydrogen gas with nitrous oxide, and natural gas with oxygen, and all are decidedly preferable to acetylene, no matter how employed. I shall not attempt to discuss the use of artificial gas and oxygen or hydrogen gas and oxygen (oxy-hydrogen) as the temperature attained, 3500° to 4500°F., is so excessive and so far beyond any dental requirement that they are decidedly contraindicated, and hence require no further comment.

THE EFFECT OF DIET ON TOOTH STRUCTURE.

OF the various investigations now being carried on with a view to establishing the relationship between calcium and other food factors, with tooth structure, one might say that the findings show that calcium in the diet does not in itself directly control calcification of teeth; indeed, its position, in this regard, is subsidiary to other dietetic factors. Vitamin A, or a nearly related vitamin which assists calcification, has a great influence upon tooth formation. There is apparently another vitamin, frequently found in cereals, which inhibits calcification. Of the cereals so far studied, says *The Dental Record*, oatmeal most potently antagonizes the calcification of the teeth. Wheat germs exert a similar action.

Full Denture Construction for the General Practitioner*

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(Continued from last issue.)

PREPARATION OF THE IMPRESSIONS FOR POURING THE CASTS.

THE upper and lower impressions have now been secured. Every precaution has been taken to secure a perfect peripheral turn at all borders of the upper and lower base as well as a detailed impression of all other parts of the mouth. The next important step is to produce a perfect positive of this impression and all its details or in other words an accurate *cast*. In order that all the markings of the impression may be accurately transferred to the cast, and because of the nature of the material from which our cast is constructed, it is necessary to do what is termed *boxing the impressions*.

There are two principal reasons for boxing the impressions: *First*, to reproduce on the cast in a definite manner the peripheral turn of the impression; second: to reinforce and strengthen the impression for the ordeal of cast pouring.

The first step in this work is to place what is known as the *foundation reinforcement*.

This is done by making a heavy mixture of plaster of Paris and placing it on a paper or slab on the laboratory bench and embedding the impression in this soft plaster of Paris. It is important to see that the impression is so placed that a line which will approximate the plane of occlusion at the crest of the ridge will be parallel to the base or the laboratory bench top. It adds much to the convenience and neatness of mounting the casts to have the base and capital parallel. It is also well to note that this foundation reinforcement extends well around the heels of the lower impression, for these are very likely to fracture if not properly supported. Before the plaster of Paris has thoroughly set, the foundation reinforcement is trimmed to approximate shape for the upper and lower.

Next is the reinforcement of the borders or turn of the impressions with modeling clay. This material can be procured at most any art store and is supplied under a variety of names. It is the same material that is used by artists in modeling and is also extensively used in kindergarten work. A piece of this clay is taken in the hands and kneaded like so much putty until it becomes soft and pliable. It is

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then made into a roll about the size of a lead pencil, one side of which is pinched to a very thin edge.

This edge is forced in, completely filling the groove all the way around the impression. It is then trimmed away with a sharp knife.

The modeling clay should come to within approximately one-eighth of an inch of the crest of the turn of the impression, and should extend outward or laterally one-eighth of an inch or possibly slightly more. This latter is important because when closing the flask the semi-plastic rubber is forced into this turn of our cast under a tremendous pressure and frequently will break away a thin or frail reinforcement, and the border turn of the vulcanite base is lost.

The next step is the wax rim reinforcement. This is really the boxing and definitely controls the size, shape, and thickness of our finished cast. There are many methods and materials used by different operators for this purpose. Some use tea-lead, others thin sheets of Britannia metal, Ash's metal, card board, linen strips dipped in melted wax, a small size automobile tire inner tube cut into rings, and various other materials. After having tried these and other techniques, the author is convinced that if accuracy, neatness and detail are to be carried out, there are but two acceptable techniques for this purpose. They are: *First*, the use of the ordinary sheet paraffin and beeswax. Every dentist uses this in various kinds of laboratory work; *second*, the use of the special banding wax or heavy strips of wax that are manufactured and sold for this special purpose. The first method will be described as being the more practical of the two in spite of the fact that it is a somewhat longer technique. This method is given, not because it is better, but because it does not necessitate the dentist buying additional and special materials for this work. Just as good results can be obtained and a little time possibly can be saved by the second or banding wax technique.

The impression having been placed on the foundation reinforcement and the modeling clay properly placed and trimmed as shown, a sheet of ordinary paraffin and beeswax is cut lengthwise in half. One piece is warmed just enough over an open flame to make it very pliable, and with the case seated on the laboratory bench this warm sheet of wax is contoured closely around the perpendicular sides of the foundation reinforcement. This will go slightly more than half way around. It is now "tacked" with hot wax in this position and the other strip of wax warmed and contoured around the remaining open portion. The two are now thoroughly seared together and all the way around to the base of the foundation reinforcement so as to make it water tight. It will now be noted that the top of the wax rim will be more or less uneven and this is trimmed to the correct height by the use of the "wax planer" or "hot plate."

This instrument is a heavy gage aluminum plate four and one-half by five inches in size and having a wooden handle.

This is heated over an open flame until the melted wax on its surface begins to smoke. The boxing with the wax rim in place is now inverted and brought lightly in contact with the hot plate and moved about with a circular motion. The hot plate will melt down and thus trim the wax evenly all around.

Next lay an instrument of some kind having a straight edge on the wax rims and move it back and forth to determine the thickness of the cast at its thinnest point. This never should be less than one-fourth of an inch.

It is well to remember that where the cast must be flaked, excessive thickness must be avoided because this will necessitate trimming the cast, an operation not easily accomplished. In case trimming should be necessary it can be done best by the use of a hack-saw, blacksmith's nippers, heavy rasps, or a course stone on a lathe.

When the wax has been trimmed to the desired height it is then ready for the final wax rim reinforcement. This reinforcement is formed by making a medium or average mixture of plaster of Paris and pouring it upon a glass or stone slab, or upon a piece of paper on the laboratory bench. The boxing is now pressed lightly into the soft plaster of Paris and with a spatula the excess around the sides is drawn up around the wax rims to strengthen and support them during the pouring of the cast material. As soon as the setting partially takes place the excess is trimmed away and the boxing finished.

Occasionally we find an operator who advocates extending the foundation reinforcement to the borders of the impression and not using the modeling clay. This is bad practice for two reasons: *First*, because the dry plaster of Paris on the thin borders of the impression will take up the moisture of the reinforcement mix. By the time the new mixture has set sufficiently to permit the proper trimming, the borders of the impression will be weakened to such an extent that they will probably break away and the effect of the impression turn be lost. *Second*, because the plaster of Paris ordinarily used for this boxing is a cheaper grade and expands more or less during setting. In the case of the lower impression it will be found that the large mass of plaster of Paris filling in the lingual space between the heels frequently has sufficient expansion to spread them. This is especially noticeable in cases having prominent lingual flanges. It is advisable to use, therefore, as small an amount of plaster of Paris as possible for the foundation reinforcement of lower impressions, and filling in as much as possible with the modeling clay.

It is also important in the lower impression in placing the modeling clay in the lingual space and between the heels not to follow the upward trend of the impression where it slightly ascends the ramus, but carry it straight back and against the boxing. This will prevent the forming of a curtain at the back part of the lower cast which

would prevent freedom of access to the lingual cusps of the posterior teeth during the occluding and articulating.

The second technique for boxing impressions where the banding wax is used is exactly the same as that just described up to the point of applying the wax rim. This special banding wax is made especially for this purpose, and may be obtained from your dental supply house. It is made in strips varying in length from eight to eighteen inches, is about one and one-half inch in width, and about one-eighth inch thick. This wax is heavy and strong enough to be placed around the case and firmly sealed to place. When this is done without further reinforcing it is ready to pour the cast. The added expense and difficulty of obtaining this special wax are its only disadvantages.

(To be continued.)

Nitrous Oxid-Oxygen Analgesia in Dental Cavity Preparation*

BY S. G. McCAUGHEY, D.D.S., OTTAWA.

I APPRECIATE the opportunity to present before you a paper on "Nitrous Oxid-Oxygen Analgesia for Cavity Preparation," a subject in which I am very much interested. Now, while this of necessity must be a paper involving mostly dental problems yet I hope that enough common ground will be found exposed to make it of some interest, at least, to medical anaesthetists as well.

Also I feel it a privilege to be another link in the chain of fraternity and co-operation, which is drawing these two great branches of the healing art more closely together; a co-operation which is the result of the now definitely established knowledge of the interdependence of these two professions.

THE PSYCHOLOGICAL PROBLEM.

Our patients, as a rule, come to us in a very agitated state of mind. The fear of dentistry is wide-spread. It is implanted in the young mind and so often fixed there by the garrulous parents or friends, whose desire for sympathy or admiration, in the pose of hero or martyr, leads them to tell with great exaggeration about the "tortures" they have just endured in the dental chair. When patients come to us in this state of mind the problem of the induction of analgesia becomes largely a psychological one.

It has been said that analgesia for dentistry is much the same as analgesia for painless childbirth, but the psychological aspect is different.

*Read during the Fourth Annual Meeting of the Canadian Society of Anaesthetists with the Canadian Medical Association, Ottawa, June 17-20, 1924.

The mental attitude of the subject for dentistry, who can wait another day of his own free will, differs from that of an expectant mother, who, when the hour arrives, cannot delay. She is in the grip of an immutable process of nature and her realization of this fact usually makes her a willing and receptive subject for analgesia.

In the subject for analgesia in dentistry, however, this state of mind must be produced by some other means.

There must be such a calm, unostentatious, genial assurance, diffused in the demeanor of the anaesthetist operator, in the tactfulness of his approach to, and explanation of the subject to the uninitiated, such a ready sympathy with his fears, notwithstanding a steadfastness of purpose during it all; even in the quiet orderliness in the deportment of the nurse or assistant in attendance, that the very atmosphere is permeated with this genial confidence, which, at first results on the part of the patient in unconscious confidence in the surety of the method and in the ability of the operator, that his will becomes plastic and then submissive to the present master of the situation.

This psychological problem is simply the production of peace of mind in the patient during the preliminaries for the administration of the gases, by such means as may be deemed expedient for the type of patient presenting—means best decided on at the time by the anaesthetist who must be able to “size up” his patient through his thorough study and knowledge of human nature.

It is simply the application to this dental procedure of the principle of anocithesia advocated by Dr. G. W. Crile, of Cleveland, for general anaesthesia and surgical operations, and means the doing away with harmful or noxious associations in the patient during the operation.¹ “It is accomplished for surgery,” to quote the late Dr. Parsons, of Denver, Colo., “by having the patient in a tranquil frame of mind before the operation, by the preliminary use of narcotics, by peripheral nerve blocking and small amounts of ether, if necessary.”

Dr. Crile says,² “Anoci-Association may further be promoted by the use of pleasant nitrous oxid instead of irritating, suffocating ether, provided only that the anaesthetist is an expert in the use of this anaesthetic.”

This principle of anocithesia may be applied to analgesia in dentistry psychologically by mental control and suggestion. Only on rare occasions in certain types is the use of a synergist necessary or advisable.

This brings us to the consideration of types. Dr. A. E. Smith,³ of Los Angeles, has divided them into—“Alcoholic and Drug Addicts, Nervous or Excitable, Susceptible and Non-susceptible.” To these I would add the “Stubborn and Suspicious or Cynical Types”—possibly both subdivisions of the nervous type and the last, which, for want of a better term, I shall call the “Ideal Type,” with modifications and combinations of all the aforesaid types.

POINTS OF PROCEDURE APPLICABLE TO ALL TYPES.

There are some points of procedure applicable to all:—An examination of the mouth having been made and a decision arrived at as to what operative procedure is necessary, the marked chart is placed on the operating table in full view of the dentist and his assistant. Analgesia is then, or has been previously, explained to the patient (I am assuming all through the paper that the patient is experiencing analgesia for the first time), impressing upon the patient that he can best receive and aid the analgesia by his willing submission to all procedures and instructions during the administrations; explaining that there is little or no odor to the gases, that the first intimation he will have of the gases' effects will perhaps be a slight drowsiness followed in some cases by a slight tingling in the hands and feet, that while he will feel no pain, he will be conscious of all that goes on, that he can speak if he so desires, that he may feel pressure, be conscious of heat and cold and that he may or may not see.

While this explanation is taking place the inhaler may be put in position and all valves being open the gases are turned on slowly till they are on full; the air valve may then be closed and when the patient begins to show signs of analgesia, the re-breathing valve, except in the case of the susceptible type, is closed.

In a few seconds the patient is instructed to open the mouth and the operating is begun on non-sensitive areas and continued there, until the state of complete confidence, attained by this suggestion of operating without pain, is reached, and satisfactory analgesia is obtained; from which time the differentiation of technique for the maintenance of analgesia and preparation of cavities is dictated by the type of patient with which one is dealing.

The alcoholic or drug addict gives more or less trouble with any anaesthetic, but so long as he is kept definitely in the first or analgesia stage the behavior is good; therefore the greatest care to keep the proper mixture of gases is necessary.

The nervous or excitable individual is a most difficult type with which to deal. The psychological factor must be emphasized and the confidence of the patient must be won. (It may be possible to neglect this factor for an anaesthesia, but not so with analgesia.) Suggestion plays a most important part and one must use such means to overcome his fear by taking his mind off the work at hand as one's judgment prompts.

It has proved successful to proceed quietly as if no fear or question were in the patient's mind and when the preparations are complete, ask the patient to cease talking and submit quietly, then commence the induction.

Too rapid induction increases the nervousness, so the induction

for this type should be slow and the commencement of the cavity preparations should always be on non-sensitive areas.

It is unwise in these two types to attempt too lengthy an administration the first time, because in the alcoholic it is so difficult to maintain just the proper stage, neither too light nor too deep, that the strain upon the dentist, who is not only anaesthetist but operator as well, is quite intense, and in the nervous there is sometimes a tendency to nausea in too prolonged analgesia.

It is a gratifying fact that one successful analgesia with the nervous type generally produces such confidence that the type is changed from the nervous to another type, because rarely is a type pure but usually predominantly one type with elements of other types in combination.

Pre-analgesic administration of sedatives is occasionally of benefit.

The suspicious and stubborn types are usually associated with the nervous and can also be changed in type.

With these types, the great factor of control is again the psychological. In the suspicious, if the confidence and mental quiet of the patient be not obtained, it is most difficult to maintain that thread-like line of analgesia, which marks the state between exaggerated consciousness and the second or excitable stage of anaesthesia.

The stubborn individual is one who taxes greatly the patience, the intuition, and the resourcefulness of the anaesthetist. He wants analgesia and he won't submit. This is a case in which the so-called "standardized technique" may be entirely discarded in favor of mental control and suggestion.

It is sometimes a most successful move when one encounters opposition to analgesia with this type, to start, without analgesia, operating upon the most sensitive area presenting. One twinge of the pain experienced, particularly in gingival cavities, is generally more effective than many words and produces a willingness which makes a most delightfully co-operative patient.

In the susceptible type we have an easy administration with this one exception, that we must be careful to keep such a proper mixture of the gases as to prevent the patient from becoming anaesthetized as the operation proceeds. It is sometimes necessary to cut down the nitrous oxide to 75 per cent. and raise the oxygen percentage accordingly.

In the non-susceptible, who is not so readily affected by the gases, the oxygen content must be reduced to 10 or 12 per cent. while the nitrous oxide is forced and rebreathing always used.

In fact in all types, except the susceptible, I believe the best results are to be obtained by *rebreathing*, while we are operating in the open mouth, because we produce more positive pressure off-setting to some extent the syphoning of air from the open mouth. It also,

according to Dr. Chas. K. Teter,⁴ produces in the bag from 4 to 8 1-2 per cent. carbon dioxid, thus obtaining from the patient himself a supply of carbon dioxid, which being given back to him replenishes the acapnial deficiency of carbon dioxid in the body, produced by the excitement or fear present in practically every subject for dental operations.

Thus it becomes evident that the physiological objection sometimes taken to nitrous oxid-oxygen anaesthesia, that it raises the blood pressure by producing acapnia is eliminated.

This phase, which is really not included in the scope of this paper, I will not attempt to discuss.

It suffices to mention that rebreathing does result in better, more even, and more easily maintained analgesia.

Mouth breathers compel a modification of induction and maintenance in all types to suit the individual case.

It is much more difficult to administer nitrous oxid-oxygen for a dental operation than any other, because the mouth is open and we have to contend with atmospheric pressure of fifteen pounds to the square inch.

The ideal type is described by Webster as "that which is accepted as a standard of excellence," and to be described as such a patient should be both physiologically and psychologically so.

I may perhaps best describe this by citing a concrete case.

Illustrative Case.—A young lady, twenty-three years of age, a graduate of arts and a student of psychology, proved to be an ideal patient. I told her she was and asked her why she thought it was so. She answered—"I wanted analgesia, I was perfectly willing to accept all the conditions; I had confidence in the agents and in the administrator and from my experiences with a former administration realized that my submission and co-operation were necessary aids to you." To this we may add that she is physically a splendid type, possesses a quiet placid disposition and is extremely intelligent. Her pulse and heart rates were normal throughout. If all patients were of such an ideal type, technique might easily be standardized.

GUIDING SIGNS AND SYMPTOMS.

Reflexes:—I have found it very difficult to formulate any definite rules as to the reflexes which tell us when to commence operating. The corneal reflexes are all present. The only definite symptoms are that the patient seems to relax and become drowsy, his speech is somewhat thickened and either very deliberate or sketchy, as of one in stupor. If a stop-watch is used, it will be found that in the average case induction will be far enough advanced in about one minute to commence the routine I have outlined. With experience gauging the onset of analgesia becomes largely a matter of intuition.

Shock:—If induction be properly carried out, with the pre-analgesia mental control established, the incidence of shock is negligible. The only shock I have ever seen is one of fatigue in the nervous patient and, in support of my claim that the attainment of mental contentment is vital to successful analgesia, let me confess that the most pronounced cases of fatigue have been in my own personal friends. I once had a very dear but apprehensive aunt faint during the analgesia, due I am sure, to my failure to overcome her dread of the whole procedure. She knew my limitations better than other patients, and promptly recovered upon the administration of pure oxygen, and the preparations were then completed uneventfully. The fatigue of my personal friends was due, no doubt, to the same psychological factor, the lack of complete confidence, although in a lesser degree.

SCOPE FOR DENTAL OPERATION.

While Analgesia is one of the greatest blessings, it is not necessary in all cases and should not be overworked. There are certain preparations, *for instance*, that a porcelain jacket crown demanding such an exact technique, at, and under, the gum margin that it is unwise to attempt the complete preparation under analgesia, largely due to the nose-piece being in the way. However, the most painful portions may be done under analgesia and the gum margins under infiltration.

It also must be pointed out that it is only necessary to do, under analgesia, such portions of the preparation as will be painful. The sterilization of the cavity, adjustment of rubber dam, polishing the enamel margins, etc., may all be done painlessly without analgesia.

Analgesia is indicated:—(1) Where intense or prolonged pain is expected. (2) Where a number of cavities present, the preparation of which will be a distinct shock to the nervous system of the patient. (3) Where it is desired to complete the work as speedily as possible, as for instance in the extremely apprehensive patient to whom one visit to the dentist is a purgatory in anticipation and each succeeding visit worse, thus producing a distinct dental shock.

Contra-indications for the use of analgesia in dentistry may be taken as the opposite of the above. In so far as the physical condition of the patient is concerned the contra-indications are few.

Advantages:—The great advantage of analgesia for cavity preparation are obviating dental shock and eliminating the fear of the dental engine; and the experience is generally so pleasant, that instead of the patient looking forward with dread to approaching visits to the dentist, the anticipation is one of equanimity.

Disadvantages:—There are some disadvantages, among which may be mentioned: (1) It is always necessary to have an assistant or dental nurse in attendance. (2) The patient can give less co-operation than without it, but this is largely compensated by the absence of

recoil from pain in the patient with a consequent interruption of work. (3) It is also more difficult to operate with the nose-piece in place, especially if operating on labio-gingival cavities in the maxillary anterior teeth.

Sensations:—The sensations incident to analgesia are peculiarly their own. The patient, in the majority of cases, seems to be travelling to remote places, he passes into a state of langor and “complete physical well being being accompanied by a sense of the insignificance of worry or anxiety.”

It appears to detach the mind of the patient from himself, and it makes him, as it were, an observer only of specific anxieties. He seems to “come back” to consciousness as if returning from a long and pleasant journey.

At times distractions such as sudden loud noises, the ringing of the telephone or remarks made in the room unrelated to the case in hand seems to recall the patient powerfully to a state of exaggerated consciousness of his surroundings and these should be avoided.

ESSENTIALS FOR SUCCESS.

There are some necessities for success:—(1) A proper machine and a nose-piece which does not intrude too greatly on the field of operation. (2) Familiarity with the minute regulations of the mechanical appliance. (3) Familiarity with the fundamental principles of producing analgesia. (4) Knowledge as to how to introduce “analgesia” to new patients and ability to obtain their complete confidence. (5) A knowledge of “suggestive therapeutics.” (6) And a most intimate knowledge of the minute dental anatomy.

Nitrous oxid-oxygen analgesia for cavity preparation ought to be, in its sphere, as great a boon to humanity as is general analgesia in surgery, because, while its field is limited to a branch of a speciality, it is daily applicable to a greater number. It presents difficulties but its advantages make it wholly worth while.

It requires a definite study as a subject separate from, yet related to, general analgesia. It is not a subject which may be summed up in so many rules and regulations, because⁶ “no apparatus” has yet been developed, nor can it be devised, which is absolutely automatic or fool-proof, nor can it be set to suit all cases. Due to idiosyncracies and variations in apparently exactly similar human machines. Every patient is a law unto himself. He may approximate certain standards and rules by averages sufficiently for these standards to be used as guide-posts, but the judgment of the anaesthetist must be the “decisive factor” of the complete administration.

CASE REPORTS.

I am appending a number of case reports, the last ten presenting prior to writing this paper, taken in order as they came:—

Case 1.—A girl, aged 16 years, nervous and susceptible; under treatment for goiter. Induction 80 seconds; very even; uneventful; color unchanged; strong heart; preparation for simple anterior cavities during $4\frac{1}{2}$ minutes; no change in pulse or breath rate; recovery immediate; no pain; no after-effects whatever.

Case 2.—Child, aged 10 years, nervous, susceptible. Induction 1 minute; preparation 5 cavities during $7\frac{1}{2}$ minutes; pulse 82; breathing 23 throughout; recovery immediate; no pain; no after-effects.

Case 3.—Married woman, aged 39 years, extremely hysterical person. Induction 1 minute; maintenance 5 minutes for 5 small cavities. No movement but talkative throughout; no pain; recovery 45 seconds.

Case 4.—Widow, aged about 50 years, extremely nervous. Induction 2 minutes, complained it was affecting her heart, but upon being assured that her heart was all right, went quietly into analgesia. Pulse 80, breathing normal; prepared two cavities in four minutes; so sensitive that she could not stand the pressure of her finger nails on them. Recovery slower than usual ($2\frac{1}{2}$ minutes) but very gradual and normal. Pulse on completion 70; put in temporary fillings and treatment after 5 minutes rest. Left the office in twenty minutes from her entry.

Case 5.—Girl, aged 11 years, highly nervous child, nervous mannerism of picking at her arms until they bleed. Induction 60 seconds, for eight simple cavities in anterior interproximal spaces. In one minute afterwards she was talking to me, analgesia absolutely even and uneventful.

Case 6.—Married woman, aged 35 years, placid, susceptible, her second analgesia. Induction 60 seconds; preparation of two cavities in 5 minutes with further induction to anaesthesia; during first thirty seconds patient was somewhat noisy due to my having allowed her to get into the excitement stage of anaesthesia. During the last of the cavity preparations, she realized by the cessation of the preparations that some change of procedure was taking place and knowing that some teeth were to be extracted became apprehensive that the extraction might start before she was completely anaesthetized. Deep anaesthesia in 60 seconds. Extracted second molar and impacted third molar in five minutes. After 10 minutes rest the cavities were filled and she left the office in three-quarters hour from entry.

Case 7.—Nurse, spinster, aged about 45 years, stout, neurotic and impatient. Had been in discomfort for some days and was very fatigued. Induction 80 seconds; preparation for 5 simple cavities during 6 minutes; pulse and breathing became normal at completion of induction and remained so. Recovery splendid; no after-effects; resumed work on the restorations in 3 minutes.

Case 8.—Married woman, aged 33 years, susceptible, nervous, but

well-controlled. Pulse before starting 102. Induction very slow (2 minutes), pulse at end of induction 90; breath rate 24; analgesia for 10 minutes, preparation for 3 cavities. Pulse on completion 82. Recovery excellent in 60 seconds. Put in temporary fillings after 5 minutes, felt very fatigued. Left office after resting for one hour during which time she slept. A personal friend. (Notice the fatigue).

Case 9.—Bride, aged 22 years, extremely nervous. Induction 2 minutes; pulse 80; breath rate 22; preparation for inlay 10 minutes. Recovery splendid in 1½ minutes. Second induction four days later. Induction 2 minutes; pulse 80; breath rate 26 and deep; preparation for inlay 12 minutes. Recovery in 1½ minutes, pulse and breathing normal. No after-effects.

Case 10.—Married woman, aged 30 years, ideal type psychologically, non-susceptible physiologically; used 12 per cent. oxygen and 88 per cent. nitrous oxid. Induction 1 minute. Analgesia for 6 minutes, some laughter, patient is happy-go-lucky, always laughing. Recovery O.K. in 45 seconds. Left office with temporary fillings in place after 10 minutes.—*Anaesthesia and Analgesia.*

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Mills that Grind Corn for Tortillas Are Both Manufactured and Used in Texas

BREAD of life is a matter of daily concern in south El Paso, Texas, where obtaining it is more than going to the store and buying a wax papered loaf.

Daybreak in south El Paso finds hundreds of brown women moving through the streets with bowls of yellow corn on their heads.

They are on their way to mills where the corn is to be ground into "masa" for tortillas that take the place of bread, rolls and biscuits among the Mexicans.

In some poor homes "metates" or crude stone mills are used to grind the corn by hand, but these have largely been replaced by "molinas" or mills operated by electric power.

Thus modern efficiency relieves the Mexican housewife as the vacuum cleaner and electric washing machine relieve her sister of the north.

MILLS MADE HERE.

Manufacture of nixtamal mills is another of the unusual industries of El Paso. Here are made the mills that grind corn for eaters of tortillas up and down the valley and throughout the southwest.

The production is not large, as many people patronize one "molina," but two mills a month are manufactured.

Some are made of iron by the Krakauer, Zork company, and some are made of wood by Francisco Luna, 3122 East San Antonia street.

Francisco is perhaps the only carpenter in the city who makes nixtamal mills of wood. He works at a bench back of his home near the canal, fashioning parts of the mills. The stones he puts in them are chiseled by the hands of Mexican laborers in Juarez.

GATHER AT THE MILLS.

Such is the mill of Juana Provencia, 59 North Walnut street. There scores of Mexican women come with their golden grain to be made into "masa" for tortillas and tamales.

Pigeons hover around the doorway of the mill and grow fat on the tid-bits that drop from the bowls of customers. Early every morning there are women waiting to have their corn ground for breakfast. They come at all hours of the day and into the night, except during the noonday when the mills stop grinding and people have their siestas. It costs two cents to have a small bowl of corn ground.

"Nixtamal mills made of iron are not so good as those of wood," Juana says, as she scrapes the grist from the stones with a wooden spatula. "Iron mills make the grain black and they are apt to crack. When they crack they are not so easy to fix as the wooden ones."

The above was published by Mildred Keough in The El Paso daily press. Local dentists claim that these conditions influence the teeth of the Mexicans who live in Texas.

School examinations reveal the fact that Mexican children have better teeth than the Americans, on account of this milling process and that they eat very little sweets.

International Dental Federation, 1926

THE next meeting of the I.D.F. will be held in the "City of Brotherly Love," Philadelphia, in 1926. This meeting should result in much greater interest on the part of American and Canadian Dentists in the International Dental Federation.

There is much work of a constructive character that is being accomplished by the Federation in the interests of world Dentistry. The commissions on Dental Hygiene, Dental Education, Scientific Research, and Dental Legislation are especially appealing and will doubtless prove of great value in supplying a world programme in these great movements.

The 1926 Convention of the International Dental Congress should be cordially endorsed by the American and Canadian Dental Associations, and both of these bodies give every assistance possible to the organization and development of the Federation.

THE COMPENDIUM

This Department is Edited by
THOMAS COWLING, B.A., D.D.S., Toronto

A SYNOPSIS OF CURRENT LITERATURE RELATING
TO THE SCIENCE AND PRACTICE OF DENTISTRY

THE PURITY OF NITROUS OXIDE GAS.

THE recent unfortunate accidents following the administration of nitrous oxide, as an anaesthetic for the extraction of teeth, raises the question of the purity of the gas used for this purpose.

It has long been known that nitrous oxide sometimes contains impurities, but as these have little or no deleterious effects upon the patient when the anaesthesia is of short duration, the necessity for a pure gas has never been strongly urged. Now, however, when nitrous oxide is used for operations of considerable duration, the possibility of toxic effects resulting from impurities in the gas becomes a problem demanding immediate attention.

It is a remarkable fact that, though nitrous oxide has been in common use for many years, the question of its purity is just now being urged. In England, a committee of the Royal Society of England has been appointed to investigate immediately into the nature and frequency of impurities that may occur in nitrous oxide gas.

At present, there is no generally recognized standard of purity for nitrous oxide; it is not included in the British Pharmacopoeia and is not subject to official tests.

THE RELATION OF CARIES TO THE STRUCTURE OF TEETH.

EXTENSIVE research has been carried on in English Medical and Dental circles, with a view to establishing the relation of dental caries and tooth structure. The prevailing opinion, based upon the findings of such investigations, are summarized in *The Dental Record*, as follows:

(1) There is a direct relationship between the structure of teeth and caries; those badly formed having greater susceptibility, those well formed being more immune to the disease.

(2) The structure of human teeth is probably controlled by dietetic factors in the same way as shown experimentally in the case of dogs.

(3) The diet of the mother during pregnancy and lactation should be good; and if a suitable diet is continued after weaning, the teeth should be very resistant to caries.

(4) The nutrition of the child in early life may be "good," but after the eruption of the teeth, "defective." The teeth then will be well formed, and for this reason will offer resistance to caries, but will later become susceptible.

(5) The nutrition of the child may be "defective" in early life, but "good" afterwards. In such cases, the resistance to caries is increased, but there will still remain a condition of susceptibility and the teeth will require constant attention.

The examination of ground sections of children's deciduous teeth shows, in nearly every case, a band of normal dentine at the amelodentinal junction, even in the most poorly formed specimens. The depth of the band varies, but is usually narrow in the cuspids and molars, and deep in the incisors. We know that a large proportion of the dentine of the incisors must be laid down before birth and during lactation, whereas in the cuspids and molars much less is formed during this period. This, no doubt, is the main reason why the incisors are so much better formed, and hence less carious than other teeth.

Recent extensive experiments dealing with the value of nutrition as a prophylactic measure against dental caries, while not disregarding Miller's chemico-parasitic theory, go to prove that caries is closely related to a deficiency in nutrition, and that a suitable diet will go a long way in combatting the attacks of bacteria.

CALCIUM CONTENT OF SALIVA AND DENTAL CARIES.

IN an interim report by A. L. Spencer-Payne, published in the January issue of *The Dental Record*, new data respecting the relationship of calcium upon dental caries is given which is of much interest to all students of preventive dentistry.

An investigation was undertaken for the purpose of discovering what relationship, if any, exists between the quantity of calcium in the saliva and the liability to dental caries. Some fifty samples of saliva were examined. A difficulty was met with early on in the examinations in that it was found that the calcium was unevenly distributed throughout the saliva which had been standing. So a modification in the technique became necessary. Analyses made of the saliva from different persons with varying oral conditions, as regards caries, calculus and periodontal disease, showed that the amount of calcium varied in the same person at different times. Analyses were, therefore, made from specimens of saliva collected at different times during the day, before and after meals, and after

stimulation of the salivary glands by such substances as salt, sugar, lemon, etc. Experiments were also carried out to ascertain the relationship between the salivary calcium content and the calcium intake. The facts so far brought to light by these investigations may be stated briefly, as follows:

The calcium content of saliva varies in different individuals, instead of remaining almost constant as does the calcium content of the blood.

It varies in the same individual on different days and at different times on the same day.

It responds to stimulation of the salivary glands.

These findings indicate how difficult it is to tabulate the results of any research in this particular department.

It is clear, however, that so far as these experiments indicate, there is no simple relation between salivary calcium content and dental caries. Acute caries may apparently occur in teeth bathed in saliva with an average calcium content, and very little caries may be found in mouths with a relatively low concentration of calcium in the saliva.

In view of the fact that these conclusions are in marked contrast to those generally accepted by many of our leading investigators, there is the probability that the research has not been sufficiently extensive. When the final report is forthcoming, no doubt new light will be shed upon this truly important dental problem.

INCIDENCE OF CARIES IN TEETH.

WE have all observed that some teeth exhibit what seems to be a greater degree of susceptibility to caries than do other teeth in the same arch and exposed to the same influences. Some dentists who are identified with that department of service commonly called "institutional dentistry," have tabulated all operations performed, and from these reports much useful data may be obtained.

One very interesting contribution to dental literature is the report appearing in the December issue of *The Military Dental Journal*, which is the official organ of the Association of Military Dental Surgeons of the United States. This report publishes the data from the examination of 7,942 young men of ages from 17 to 24, the average being in the eighteenth year. These young men were from all sections of the country, and had followed a variety of vocations. It is to be noted, also, that these men were considered generally physically fit, and the examinations for dental defects were made under a uniform procedure; that is, the same forms and notations were used in all the tests. The condition of every tooth in the arch

was recorded, excepting the third molars. For obvious reasons, it would not be wise to include these teeth.

A partial summing-up of the finding of this examination may be given as follows:

In the group there were 6,819 teeth lost, 1,190 crowned, and 54,972 surface involvements by caries, making a total of 62,981 affections by caries.

The mandibular first molar was the chief sufferer in each case, and of teeth lost, the ratio of loss of this tooth to loss of the maxillary first molar is 2.36. The occlusal surface of the mandibular first molar exhibited caries in 56 per cent. of the cases, this being the highest incidence of any surface of any tooth involved.

There is a marked difference in susceptibility of the different teeth to caries, and the lesion is usually located in definite areas of certain teeth.

The first molars are the most susceptible, and the mandibular first molar is 2.36 times as susceptible as the maxillary first molar. The mandibular anterior eight teeth are highly resistant to caries, the average susceptibility of these teeth, as compared with the most susceptible tooth, is as 1 to 39.

The resistance of the maxillary cuspid is high, its susceptibility to caries, when compared with the mandibular first molar, is as 1 to 29. The occurrence of caries is symmetrical. The incidence of caries is slightly greater on the left than on the right side in both maxilla and mandible.

ATROPHY OF THE ALVEOLUS PARADENTITIS AND PYORRHEA ALVEOLARIS.

THE etiology of pyorrhea has long been a subject of controversy. Many and varied have been the theories advanced regarding the causative factors involved. In an abstract of a paper published by F. J. Lang (Innsbruck), *The International Journal of Orthodontia* comments as follows: Absorption of the calcium leaves the bone a mere mass of fibrous tissue . . . Alveolar atrophy is not a matter of years, for while it is most often encountered in advanced age, it may be met with in early life. Alveolar atrophy may be favored by a great variety of local and general conditions—for example, in the old by arteriosclerosis and independently of age by calculus formation. Pyorrhea may be due to rarefying osteitis and paradentitis, which has, as a sequela, the atrophy of the alveolar process.

Regarding this view of the causation of pyorrhea, Prinz (Philadelphia), in *The Dental Cosmos*, has stated his opinion, as follows:

We know that pyorrhea is a primary atrophy of the alveolar

bone, the latter having a natural tendency to such atrophy because, unlike most bone, there are no muscles inserted in it. But occlusal impact takes the place of muscular attachment, to some extent. Infection is only an unessential accident in the development of pyorrhea.

Dr. Prinz recognizes two types, viz., vertical and horizontal pyorrhea. In vertical pyorrhea, there is the inevitable separation and loosening of the teeth, followed by pocket formation and infection. In the horizontal type, there is suppurative gingivitis, accompanied with large quantities of supragingival calculus, pocket formation being slight and separation rare, loosening of the teeth occurring at a very late period.

Roentgenograms are the best means of diagnosis and determining the full extent of absorption. The type classified as horizontal pyorrhea can be prevented by ordinary buccal hygiene.

THE REMOVAL OF PULPS.

THE question as to the selection of a method for the removal of dental pulps is discussed in a recent issue of *The Dental Cosmos*. The opinions herein expressed are as follows:

Pressure anaesthesia is contra-indicated in all cases of infected pulps, because the pressure used to bring about anaesthesia may also force the infectious micro-organisms through the foramina.

Conduction anaesthesia, though eminently successful in cases involving the extraction of teeth, falls far short of the ideal in the extirpation of pulp tissue, because the beneficial effects of the anaesthetic do not extend, in most instances, to the pulp chamber.

The best results are to be obtained by the infiltration method, using a solution of novocain and suprarenin. The injection is best made against the alveolar plate at the level of the apex or apices of the tooth.

It is rather difficult to infiltrate successfully in the region of the mandibular molars, because of the dense buccal plates surrounding them. With such cases, it is best to apply a small quantity of arsenic to the pulp chamber, and, if necessary, use the infiltration process at the next sitting.

The methods whereby best results are to be obtained are described as follows:

Use a needle about an inch long and of 26 gauge. Introduce it at the junction of the mucous tissue and the muscular fold, and there deposit a few drops; then carry the needle to the bone at the point of the apex and, with the opening of the needle against the plate, force the liquid against the plate. It will infiltrate through the pores of the plate into the interior of the bone and to the nerve. The

suprarenin will, at the same time, contract the arteries in the tissues and at the foramina, and permit operating on the pulp without undue haemorrhage. In multi-rooted teeth, it will be found necessary to divide the injection, so that the labial root can be infiltrated through a labial injection, and the palatal root through a palatal injection. A tooth with one root requires one injection, labially or buccally.

TREATING INFECTED TEETH WITH SODIUM PEROXIDE.

J. LUBETZKI, of the Dental School of Paris, in a paper read to the Societe d'Odontologie of Paris, recommends the use of sodium peroxide in the treatment of infected root canals. This alkali, he claims, is sufficiently powerful to carry its antiseptic action into the narrowest canals, and to transform the infected mass of root dentine into a mass of sterile dentine. Before using the sodium peroxide, all the canals must be located and opened up mechanically. Care must be observed lest any of the infectious material be forced beyond the roots. The making of false canals, when using reamers, must also be avoided. Indeed, when using sodium peroxide, the use of reamers or other cutting instruments may be almost dispensed with.

When sodium peroxide comes into contact with water, it decomposes into sodium hydroxide and hydrogen peroxide. The sodium hydroxide enlarges the canal and destroys all the organic elements. All strands of tissue remaining in the canals are completely destroyed. Some nascent oxygen is produced, which has a strong action upon certain bacteria, and in addition, by its bubbling action, it helps to remove the canal contents.

The method suggested for using the sodium peroxide, is as follows: The cavity is first cleared of all debris of softened dentine, the orifices of the canals exposed, and the tooth cavity washed several times and finally dried.

The tooth is isolated with the rubber dam and the openings to the canals are located by passing a smooth broach into them. Dip the broach into glycerine and transfer to the canals, until the canals are saturated; then load the broach with sodium peroxide and introduce it as far as possible into the canals. No pressure should be used, on account of the danger of forcing septic matter into the peri-apical region. Soon a bubbling will be observed, which may be aided by blowing in hot air. As the reaction continues, it will be found that the broach can be inserted farther and farther into the canal. The action is remarkably rapid. When the cleaning of the canal is sufficiently complete, the pulp cavity is thoroughly washed and dried. The permanent root canal filling may then be inserted, unless the indications call for the sealing-in of treatments, in order to test out the thoroughness of the cleansing operations.

ORAL HEALTH

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TORONTO, SEPTEMBER, 1924

No. 9

EDITORIAL

To Be or Not to Be a "Hundred Percenter"

THE term "hundred percenter" was originally applied to a group of dentists who advised the extraction of every pulpless tooth. These "radicals" failed entirely to differentiate between a pulpless tooth and a *dead* tooth, and certainly earned the appellation of "ruthless extractors."

A new group of "hundred percenters" has arisen, holding just as radical views, regarding infection in the tissues surrounding the roots of the teeth, as did the original "hundred percenters." These men adopt such a pessimistic and hopeless attitude toward treatment and prognosis in cases of periclasia that they advise extraction *in every case*. Others, again, are not satisfied with the removal of the teeth and curettement of the alveolus, but actually remove surgically the entire gingival and alveolar tissues, including the affected teeth.

Just as periapical infection may have progressed to the point where the diagnosis is negative and extraction advisable, so in gingival and pericemental infection the condition may point to a *negative* diagnosis. In both conditions, however, we may have infective areas, but because of their character and extent, or the condition of the patient, the prognosis is *positive*, and with proper treatment the teeth may be saved in a condition of health. A vital factor is the need for a scientific diagnosis. Treatment may or may not be justified, and in this sense

no man should be a "hundred percenter," but should appreciate all of the possibilities of the case in hand, and, without swinging to one extreme or another, make a scientific diagnosis and give skilful treatment when treatment is indicated. The dentist who assumes that attitude is giving his patients "one hundred per cent." dental health service.

Dental Society Organizations

THE vacation season is now over, and members of the Dental Profession are naturally turning their thoughts toward the important work that is to be accomplished through Study Clubs and Dental Society meetings.

Dr. Arthur Day, President of the Toronto Academy of Dentistry, has written the Editor, strongly urging the claims of the Academy upon the dentists of the City, and we can assure the officers of the Academy that ORAL HEALTH will lend every possible support. We hope that every dentist will devote his best effort to the affairs of the Academy. And what is true of the Toronto Academy is true of all the local dental organizations throughout Canada. Send notices of meetings, reports, papers presented, and any other items of interest, for publication. Such reports, received from widely separated points throughout Canada, will prove of great value to the entire Canadian Dental Profession.

Dr. Day has expressed his views so clearly, that we are taking the liberty of publishing his letter elsewhere in this issue in the hope that it may have the effect of stimulating activity in local centres. What wonderful progress dentistry would make with unity of effort and complete organization of the entire profession into local, provincial and national Dental Associations!

Letters to the Editor

To the Editor, ORAL HEALTH,—If I am not infringing too much on your kindness, I would like to express through the columns of ORAL HEALTH, my sincere gratitude to the essayists and clinicians, and to the Vancouver boys who made the recent meeting of the Canadian Dental Association such a success. Their local committees, under the able guidance of Dr. Bruce, worked hard, and produced a splendid programme. The clinics were especially good, and I heard many flattering comments on the work done by the clinicians. The entertainment provided was characteristic of Western hospitality, and will not soon be forgotten by those who had the good fortune to be present. Special credit is due to the Ladies' Aid of the Vancouver Dental Society, who entertained the visiting ladies most royally. Also let me thank ORAL HEALTH for the publicity given our meeting. Without

the co-operation of the dental magazines, and the dental dealers, our conventions could not be the success they are. The dental manufacturer's exhibit at Vancouver presented a splendid opportunity for many to see the best and most modern ideas in equipment and appliances.

The meeting at Vancouver instilled new life into our national dental society, and demonstrated clearly that geographical location does not hinder enthusiastic and successful meetings being held at other than centrally located cities.

To my successor in office, Dr. G. K. Thomson, of Halifax, I extend my congratulations and wish every success to the meeting of 1926, which will be held in that city.

Sincerely yours,

SYDNEY W. BRADLEY.

206 Laurier Ave. W., Ottawa, Ontario.

* * *

To the Editor, ORAL HEALTH,—“A primary object of the Toronto Academy of Dentistry should be to get all the dentists together, so that they may take an interest in the affairs of the profession in the city. Dissatisfaction among some men, as a rule, and disagreements, are the results of misunderstandings and failing to get together. It is an accepted fact in all bodies, that the best way to keep one satisfied is to give each one something to do.

“Generally the work in dental organizations is left to a few, and it is easy for those outside of that few to criticize. Every Dentist should be a member so that the Academy will represent every class in the profession and every man have a share in shaping its policies. It is necessary also that they all get together occasionally to discuss with one another the different ways of conducting a practice. The man struggling to get a living can get ideas from the successful practitioner of better ways of getting business. And the successful man on the other hand will learn to have a more sympathetic feeling for the one not so well off, and for his ways of conducting practice. There can be no harm whatever in all classes meeting one another and getting to know one another.

“Business men in any one line of business get together in conventions; business men in all lines get together at weekly downtown luncheons to discuss with one another their different ways of doing business, each one learning from the other. Dentists with their much more highly developed ethics, and with the many civil laws pertaining to the practice of dentistry, have infinitely more to discuss among themselves than the ordinary business man has. Besides which the dentist has all the different problems pertaining to methods of performing the many dental operations. When the dentists start taking an interest in their own public affairs, that interest will develop, until soon they will be just as interested as business men are in their affairs. Developing such an interest can't help but broaden out the

professional man, who naturally has a tendency towards narrowness.

"The Dental Golf Tournaments this summer have been a great success. That success was not because the men especially wanted a game of golf, but because it was an opportunity for the men to form friendships—friendships which they enjoyed. The friendships formed, and the good fellowship displayed, are the backbone of any club or organization. The Academy furnishes the means of forming congenial friendship, where certain difficult cases can be discussed among three or four over a cigar and a cup of coffee.

"As regards the younger men in practice, it will be the policy of the executive to encourage them to take a leading part. Every means will be used to make the interest general among the members; to introduce new blood and keep the society from getting stale. There is no reason why all the dentists in the city should not be members.

"The greater the membership, the more funds the executive have to spend on the year's programme. And the better the programme, the larger will be the membership. Each one affects the other. The executive are already promising a good programme, counting in advance on a large membership. Let us all join up; the old members; some of the older practitioners who have not already joined for some reason that has passed and gone years ago; and the young men in practice, the ones who have most to gain. Don't let it be said that you are sitting back and letting some one else run your affairs.

Sincerely yours,

ARTHUR DAY."

Transportation to the American Dental Association Meeting at Dallas, Texas

A RATE of one and one-half fare on the Round trip Identification Certificate Plan has been authorized by practically all the railroads of the United States, and by the Canadian Passenger Association, Eastern Lines territory, viz.: Points in Canada, east of and including Armstrong and Fort William, Ont. Good going November 4-10, 1924, inclusive.

Identification Certificates may be obtained through the Chairman of the Transportation Committee, D. C. Bacon, 31 North State St., Chicago, Ill. Upon surrender of these certificates to the local ticket agent, round-trip tickets at one and one-half fare for the member and dependent members of his family will be sold. Tickets must be validated at Dallas, Texas, by agents at the regular ticket offices of the lines over which tickets read into Dallas.

OLD MEXICO: The Transportation Committee is working on a ten-days' or two-weeks' tour of Old Mexico following the Dallas convention. Details of this trip will be covered in subsequent issues.

D. C. BACON,

Chairman Transportation Com., A.D.A.

Materia Medica

What are these unknown flowers
That star this lovely earth,
Wasting through long sweet hours
Their beauty and their worth ?

What are these plants unknown
That paint the desert's floor
With a splendor all their own
Where no light lived before ?

O foolish man and blind ;
Here is Earth's healing grace
For thee and all thy kind
To build her perfect race.

There springs no smallest flower
In all God's wilderness
But He has given it power
To better thee and bless.

Their truth shall make thee wise,
Their virtues make thee whole,
Their glory fill thine eyes,
With loveliness of soul.

This earth is holy ground,
And every seed and spore
In harmony is bound
Some discord to restore.

Each with its balm for pain
Shall serve thy need, and prove
They take God's name in vain
Who reckon without love.

BLISS CARMAN.



THE LATE LIEUT.-COL. H. R. ABBOTT
DENTIST AND PUBLIC SPIRITED CITIZEN

*Dr. Abbott bequeathed \$15,000 to the Royal College of Dental Surgeons of Ontario,
as an endowment to supply books for a Memorial Dental Library*

ORAL HEALTH

A JOURNAL THAT STANDS FOR THE "OUNCE OF PREVENTION," AS WELL AS THE "POUND OF CURE"

Vol. 14

TORONTO, OCTOBER, 1924

No. 10

Root Canal Problems*

EDGAR D. COOLIDGE, D.D.S., CHICAGO, ILL.

THE first problem that confronts those who practise the treatment of pulpless teeth is to assure themselves and reassure themselves that pulpless teeth properly treated and filled will retain a healthy condition of the periapical tissue about their roots after filling. The test of a pulpless tooth is not based upon the local comfort or discomfort experienced by the patient, so much as it is upon the radiographic finding and the record of the history of the tooth. Diagnosis made by radiographic interpretation cannot be relied upon in all cases without several radiograms taken at different angles of the same area, to prevent overlooking the area directly in line with the shadow of the tooth examined. If a pulpless tooth is treated with the same consideration with which other minor surgical operations are performed, and complete records are kept for future reference, there will soon be an abundance of evidence in one's own records for reassurance that the tissue about a properly treated and properly filled pulpless tooth will stand the radiographic test at any time.

Success in root canal operations does not depend so much upon the following of some one individual technique as it does upon the carefulness in diagnosis, the thoroughness of the operations, and upon a conformance to the laws of nature as revealed to us by the study of histology and pathology. There may be different methods of technique and different drug treatment, and the root filling material may be handled in more than one way and yet give a high degree of success if the operations are carefully done. The greatest skill can

* Read before the Indiana State Dental Society, May, 1924.

be acquired by perfecting a definite technique rather than by trying first one and then another.

PREVENTION IN ROOT CANAL TREATMENT.

The greatest service in root canal operation is to prevent, rather than to correct, infection and periapical tissue lesions. It is necessary, then, to consider what causes these lesions which appear in the periapical soft tissue and bone. It must be assumed that all such areas are infected at some time. It is possible to have periapical tissue changes take place because of occlusal trauma and abnormal stress upon a tooth. Such a condition may occur where the tooth contains a vital pulp. A pulpless tooth containing a root canal filling and showing such a condition would be under suspicion, and would be far more liable to be condemned than the one containing a vital pulp, and yet might be just as susceptible to correction by proper treatment.

The things that are mostly responsible for periapical tissue disturbance following root canal operations are almost entirely under the control of the operator. Infection forced or carried through the apical foramen is the greatest factor. This occurs when pressure anaesthesia is used to desensitize a pulp before thorough surface disinfection has been accomplished, or by carrying infection by means of the broach from one portion of an infected pulp to the apical tissue. Over-manipulation and injury of the periapical tissue by mechanical means, injury by caustic drugs or by an excess of any drug which is forced through the apical foramen, will cause inflammatory reactions which result in tissue changes in this area and will be found by radiographic examination very soon after filling the root. By a careful analysis of the causes of periapical absorptions one can many times find the weak places in one's technique and thus prevent injury to the periapical tissue while a tooth is under treatment. This may prevent the development of the condition about the root end by which a future examination would reveal sufficient evidence to justify the extraction of the tooth only recently treated.

IMPORTANCE OF CASE HISTORIES.

There are three classes into which roots showing periapical changes may be placed. First, those showing large radiolucent areas where there is considerable bone involvement, with the apex of the root projecting into the cavity, which even the most conservative would condemn for extraction. Second, those cases showing slight tissue change with very little loss of bone. These areas may be circumscribed by an area of dense tissue which is nature's method of protection against the infection. Third, the border-line cases which show some evidence of bone involvement of an indistinct outline. If case histories were available for each root canal filling, showing a

complete record of the treatment preceding the canal filling and radiographs showing the condition of the periapical tissue before and after treatment, it would be of great help in determining more of the causes of the pathological areas which we find to-day about the root of teeth. Quite frequently a radiograph will show periapical tissue changes taking place before pulp removal, and if such areas do not clear up after treatment it does not reflect as much discredit to the operator as when changes take place where the condition was perfectly normal before operating upon the pulp. A reference to the history in such questionable cases is of value in the diagnosis, as it may prevent a useful tooth from being condemned too hastily.

A frequent survey of one's root canal fillings over a period of years, made by radiographic examination, is of great benefit to the operator. One should study the history of both the successful cases and the unsuccessful ones as well.

DIAGNOSIS OF PULP AND PERIAPICAL TISSUE.

It has been of considerable help to the writer to follow a very brief classification of the pulp and periapical tissue conditions. Of the teeth containing pulps only four conditions are classified. It is desirable to keep a classification as simple as possible where one is called upon to use it in a busy practice.

1. Condition of Pulp—
 1. Normal.
 2. Hyperemia or Inflammation.
 3. Exposed by caries.
 4. Gangrene.
2. Pulpless Teeth—
 1. Dead pulp.
 2. Previous root filling.
3. Condition of Periapical Tissue—
 1. Normal.
 2. Acute abscess.
 3. Granuloma.
 4. Liquefaction necrosis.
 5. Infection cyst.

When the examination is made the classification is recorded upon a form suggested by Dr. Arthur D. Black for the Pulp Case History.¹ The history when complete will contain all information in regard to diagnosis, the date of every treatment and the drugs used, the method of sealing the tooth, the root canal filling, and a blank space for subsequent examination records by radiograph. This blank form is printed on the outside of an envelope which is filled in after each operation: and the measuring wires, radiograms and all other records of the case are kept and filed. The case history becomes more

valuable as time passes and subsequent examinations are made to determine the condition of the periapical bone and soft tissue.

PULP REMOVAL.

Quite frequently it becomes necessary to remove a vital pulp. People are still guilty of neglect of their teeth, and sometimes the thermal shock under a large filling or crown will cause a hyperemia to develop which forces the removal of the pulp.

The radiogram of a root containing a diseased pulp will often show that the periapical tissue is already involved in some pathological change, while the pulp still reacts to the vitality tests. After carefully removing the pulp and filling the canal, with attention in every detail of the operation not to injure the periapical tissue, there may still be a condition present which any other operator or diagnostician would suspect. We may not feel assured that such an area is not infected, but at least we may feel certain that this pathological area was not directly or indirectly caused by the treatment of the root canal. A radiogram should always be taken before beginning to operate upon any canal. Dr. Carl Grove has stated that²: "our present technique of pulp removal has failed to prevent periapical infection because this tissue has not been preserved, and not because we failed to make perfect fillings." This statement, backed up by his beautiful histological sections, furnishes convincing evidence that it is not so important to have the root canal so well filled that there is some protrusion of the gutta-percha, as it is to avoid injury of the tissue beyond the foramen.

Histological sections and photographs show that the peridental membrane reaches up into the foramen of the root, and that the pulp tissue begins at the dento-cemental junction, which may be quite a distance from what appears in a radiogram to be the apex of the root. Grove also states³ that all pulp tissue should be removed without injury to the apical tissue, so that the cementoblasts lining the foramen may continue to function and gradually narrow down the diameter of the cemental foramen to its final closure after the completion of the root canal filling.

MULTIPLE FORAMINA.

In pulp removal what shall be done with the many branches of the canals and the multiple foramina? At first thought one might easily be discouraged and decide that complete pulp removal is impossible and consequently the success of the operation is hopeless. The canal fillings that were put in before much was thought of multiple foramina have proven successful in many cases. Many partially filled canals have stood the test of time, and it appears that too much importance has been attached to the filling of multiple foramina as stated by Hatton.¹ It will be found by looking over the present-day

literature that the question of multiple foramina has been overworked. All foramina are formed by cementum and are consequently lined with cementoblasts, while the pulp tissue lies within the dentin.⁵ As the pulp tissue is removed from the root, the blood vessels and nerve tissue lying within these small openings through the cementum are gradually closed by nature in a way that completely obliterates them, if they are not injured during pulp removal by mechanical or chemical injury or by bacterial invasion. This fact seems to be a reasonable argument against the use of arsenic or other caustic drugs in devitalization and removal of the pulp. The periapical tissue is very susceptible to injury and consequent inflammatory reaction. More often injury results from an attempt to fill multiple canals, than from infection through these where the main canal is thoroughly cleaned and filled to the dento-cemental junction. Noyes says that he⁶ "can see very little difference as to whether you have one opening at the end of a root, or three or four, as far as the technique is concerned." New layers of cementum are laid down upon the surface of the root as long as a healthy tissue exists about the root, but not if the attachment of periodontal fibre to cementum is interfered with by drugs or mechanical injury of any kind.

The consideration of the most importance in pulp removal and all root canal treatment is to preserve a healthy periapical tissue that will continue to function. New layers of cementum must be laid down to support the attachment of pericemental tissue. Partial pulp removal, injurious drug treatment, mechanical injury and infection, must be guarded against as causes of periapical tissue changes subsequently found by radiogram. The method of pulp removal has been found to be one of the causes of injury to the periapical tissue.

METHOD OF PULP REMOVAL AS A CAUSE OF PERIAPICAL PATHOLOGY.

In checking up our records of pulp removal by means of cocain pressure anaesthesia, ^{7, 8} it was found that the radiograms of many cases show areas of periapical tissue change, some appearing immediately after root filling and others in a few months. These radiolucent areas vary from small dark lines over the apex of the root to larger areas including some bone absorption. The careful study of these cases revealed the fact that where the pulps were exposed, or nearly exposed, by caries, and immediate pulp removal was performed, that periapical tissue involvement followed in a large per cent. of the cases. Where an antiseptic dressing was sealed in the cavity for a period of twenty-four hours, and the pulp removed at the second sitting, the periapical tissue nearly always appeared normal in the check-up radiogram. *The conclusion arrived at was that all cases of cocain pressure anaesthesia should be preceded by an antiseptic*

dressings, so as not to force infection lying in carious dentin or upon the surface of the pulp through the apical foramen to infect the periapical tissue.

It is also quite likely that the solution used in cocain pressure anaesthesia is frequently too strong. Basedo states in his text book on *Materia Medica, Pharmacology and Therapeutics*, that: "Cocain is a general protoplasmic poison, capable of irritating and destroying cells, or stopping the motion of leucocytes, amebae and ciliated cells. Solutions above five per cent. in strength, injected hypodermically, may result in the death of the tissue, which shows either as a necrotic area of the skin or as a sterile abscess."

Local anaesthesia by infiltration or block anaesthesia is the safest method of pulp removal. Even by this method there is danger of periapical infection in the technique of pulp removal, and as a precaution an antiseptic dressing should always be sealed in the tooth before removing the pulp. The use of phenol, acids or strong alkalies, to remove remnants of the pulp and open small canals, has also been responsible for some of the destruction of tissue which shows up in the radiogram as a radiolucent area soon after the canal is filled.

ROOT CANAL TREATMENT.

Asepsis in root canal treatment can only be accomplished by isolating the field of operation by means of the rubber dam and by thoroughly cleansing the field with antiseptics. As a precaution the field of operation should be coated with tincture of iodine before opening the pulp chamber. In cases where the crown of the tooth is broken or decayed away so that the dam cannot be clamped on, a thin copper or gold band should be fitted around the tooth and cemented to place, so that the rubber dam can be adjusted easily and quickly, and insure a dry aseptic field for the operations. Unless operations within the pulp chamber be considered as minor surgical operations, and equal precaution be used to prevent infection from getting into the periapical tissue, one is taking great chances of causing the loss of a tooth at a near future time, and thus bringing disrepute upon root canal treatment. Grove recommends immediate canal filling on the basis of reducing the danger of periapical infection.³ There are some good reasons for not following immediate canal filling. In most cases it requires too long to prepare the canals properly and fill them at the same sitting, to make the entire operation at once. Again, where the apical foramen is large and the periapical tissue is under the influence of anaesthesia, the difficulty of preventing over-filling is greatly increased. A mild antiseptic dressing, such as oil of cloves, sealed in the canal and covered with temporary cement, will keep the canal clean and comfortable until a subsequent sitting, when the canal may be filled.

ROOT CANAL FILLING.

The best root canal filling is gutta-percha. Cones of gutta-percha, sterilized by heat or in alcohol, should be selected to suit the size of the canal, and cut in pieces of two to three millimetres long. The canal should be measured by placing a wire in the canal to the apex of the root, and bent over a ledge on the occlusal surface, to prevent forcing it too far when sealing the tooth with gutta-percha. A radiogram now taken gives the required information as to the length of the canal. With the measure of the canal before the operator, the gutta-percha cones ready, the canal may be coated with eucalyptol, or a resinous solution, as originally suggested by the late Dr. Callahan, and the selected cones cut out in short pieces, slightly warmed, and packed into the canal until it is full. There will be some variance in detail of technique, and it little matters so long as the canal is filled to the dento-cemental junction with a dense mass of gutta-percha that will not shrink and leave open spaces for bacterial development. Over-filled canals are more susceptible to apical tissue pathology, and great care should be taken to guard against injury to that tissue. It is more difficult to fill a large canal with a large apical foramen, without over-filling, than to successfully enlarge and fill a small canal.

PULPLESS TEETH.

The treatment of pulpless teeth where the periapical tissue has become involved, and shows a radiolucent area about the root apex, deals with different problems. The root canal can be mechanically cleaned, and by judicious use of antiseptic drugs it can be put into a satisfactory condition for safe filling.

Pulpless teeth should be treated with antiseptics which will not cauterize or destroy the soft tissue should they get beyond the apical foramen. Cresol or cresatin, the active principle of meta-cresol, are especially suitable for these cases. Dichloramin-T is also a very useful antiseptic by virtue of its yielding nascent chlorine, which is a powerful antiseptic that does not destroy vital tissue. From two to four treatments of any of these drugs, combined with thorough mechanical cleaning and curettement, may be required to prepare the canal for filling. The periapical tissue that is pathological needs much consideration, and no result can be determined until sufficient time has elapsed after the treatment to observe its changes.

There is a diversity of methods of treatment of the periapical tissue, each seemingly successful from the reports given. This variance is referred to in an editorial of one of our leading journals⁹ as "The anomalous, not to say uncertain, position in which we find dental practice to-day." It seems, however, that iodine is becoming more generally used as the treatment where periapical tissue regen-

cration is desired. It little matters whether Churchill's tincture, Lugol's solution, or the Official tincture is used, as far as the result obtained is concerned. I use the Official tincture of iodine without ionization, and find the results very gratifying. No drug that will coagulate albumin and cause tissue destruction should be used in any canal treatment. The successful treatment of canals of this class is dependent upon the condition of the apical cementum.

If the cementum is denuded and suppurative products have destroyed the cementoblasts of an area of the root, no amount of treatment can cause a regeneration of tissue over such an area. Dr. Noyes states "that infection passing through the foramen does not spread along the surface of the root, but passes out between the fibres following the course of the vessels, especially the lymphatics." He also states "that the surface of the cementum is the last area upon which these tissues are destroyed, and it seems to me that is one of the items of hope in our problem." It is not possible to determine in the diagnosis whether there is a destruction of tissue on the surface of the cementum, but with this thought in mind one can eliminate certain types of conditions with large, distinct and well-defined outline of bone absorption about the root apex by extraction. The small radiolucent areas and the areas of indistinct outline will very often clear up entirely following proper treatment. The sacrifice of useful teeth, because of suspicion only, is not consistent with the best methods of practice, and it is a serious mistake to deprive a patient of a useful tooth unless it is hopelessly diseased. Black says¹⁰ that teeth are too often sacrificed on suspicion, and that "the determination whether or not to extract the tooth will nearly always require a demonstration that the cementum of the root has been denuded." Careful treatment and complete records of these cases, together with subsequent examination by radiograms, will soon prove up the uncertain conditions, and many teeth will be retained that would otherwise be sacrificed.

SUMMARY.

It is generally believed that root canal filling is a possible method of saving pulpless teeth without endangering the health of the patient, providing it is practised under aseptic precautions and not dependent upon antiseptic treatment. The comfort of the patient is not a safe thing to rely upon as to the condition of the periapical tissue, as there may be a pathological condition which would endanger the health of the patient if allowed to remain, and yet cause no local discomfort. Hence frequent examinations by radiograms must be made to observe any changes taking place in the periapical tissue.

Teeth badly involved in bone absorption about the apex of the root should be extracted. Teeth showing small areas of tissue de-

struction about the root apex will usually improve after proper treatment and filling of the canal.

Injury of the periapical tissue by mechanical, chemical, or bacterial means is a predisposing factor in causing future pathological areas to develop about the root apex. In treating canals great care should be taken not to cause any injury nor to over-fill the canal, especially where the periapical tissue appears normal.

In pulp removal an antiseptic dressing should always be sealed over the pulp before attempting to remove it. Strong drugs should be avoided, and great care should be taken not to allow anything to pass beyond the dento-cemental junction.

Well-filled pulpless teeth, showing a healthy periapical tissue, are far more useful than artificial teeth, and it is service of the highest type to save the natural teeth, so that the health of the individual may not be jeopardized either by loss of masticating efficiency or by subsequent pathology of the periapical tissue.

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American Society of Orthodontists

THE Twenty-fourth Annual Meeting of the American Society of Orthodontists will be held at the new Atlanta-Biltmore Hotel, Atlanta, Ga., April 14, 15, 16 and 17, 1925.

WALTER H. ELLIS,

Secretary-Treasurer,
397 Delaware Ave.,
Buffalo, N.Y.

CLINTON C. HOWARD,

President,
Doctors' Building,
Atlanta, Ga.

Full Denture Construction for the General Practitioner*

BY I. LESTER FURNAS, D.D.S., CLEVELAND, OHIO.

*Professor of Prosthetic Dentistry, Dental School,
Western Reserve University.*

(Continued from last issue.)

SEPARATING MEDIUMS.

THE object of the separating medium is to form a distinct line of demarcation between the impression and the cast material, and prevent the two from adhering or sticking together. There are four distinct kinds of separating mediums, namely, first, ethereal solutions; second, alcoholic solutions; third, aqueous solutions; and fourth, oils. The last named class never should be chosen where the cast is to be used for vulcanite work, because of the danger of leaving a thin coating of oil over the surface of the cast, which would result in injury to the vulcanite. The dental dealer can supply you with a variety of these separating mediums from each of the other classes. These are placed on the market under various secret formula and different trade names.

The best separating medium that the author has ever used, and the universally successful, is an alcoholic solution of shellac and of sandarac. These gums are easy to make up into stock solutions and easy to keep in that form. Solution A is a twenty-five per cent. solution of shellac in alcohol. Solution B is a twenty-five per cent. solution of sandarac in alcohol. In case either solution becomes too thick, it may be thinned by adding slightly more alcohol.

The principle upon which these solutions work is as follows: Solution A, when painted over the plaster of Paris surface of the impression, is at once absorbed into the dry plaster of Paris. The alcohol content soon evaporates, leaving the shellac as a hard filler. This acts as a foundation for solution B. When solution B is applied, the minute openings of the plaster of Paris surface have been filled by the shellac in solution A so that it cannot penetrate. It therefore remains on the surface, and, as the alcohol evaporates, leaves a hard, smooth, glazed surface. This serves to transmit a hard smooth surface to the cast. The practice of using just the sandarac or just the shellac is wrong, because either alone will not give the desired results. The separating medium can be applied before the impression is boxed, provided it has had sufficient time to dry and the operator prefers this method, but the separating

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medium should not be applied while moisture remains in the plaster of Paris.

After solutions A and B have each been applied and each allowed to dry thoroughly, the boxing is next filled with water and allowed to stand for from five to fifteen minutes. This water is then poured out and impression coated with a heavy coating of soap suds. A convenient method of applying the latter is to have an old glass or cup, in the bottom of which is a cake of heavy laundry soap (not toilet or liquid soap), and in this an old shaving brush or a small varnish brush. When the soap is needed the brush is dipped in water, and a lather or suds is worked up, after the manner in which a barber makes a lather. This is then applied to the boxed impression, and the brush returned to the glass until it is needed again. The soap suds are now immediately flushed out of the boxing, leaving only a very thin oil coating, which acts as a separating medium between the cast and the separating medium proper. Many times when the cast and impression are separated they will come apart very easily, but the separating medium adheres to the cast. This necessitates much scraping in order to remove it, and consequently mars or destroys the desired smooth surface of the cast.

Solution A may be colored by adding a few cuttings from the lead in an indelible pencil. This coloring will serve as a warning signal to the operator, when trimming the plaster of Paris of the impression, that he is nearing the surface of the cast.

The total thickness of these coatings just as described, when placed on a micrometer, will measure less than one ten-thousandth of an inch, and will make no difference in the adaptation of the finished case.

The soaking of the impression just prior to the pouring of the cast, as previously described, is an important detail. If this precaution is not taken, the operator will very likely experience the following difficulty:

The impression will be carefully coated with the separating mediums and, upon careful inspection, will present a fine, smooth, glazed surface. There will be, however, many very small openings in the surface of the separating medium, due to bubbles or some foreign substance in the solution or on the impression. When the cast is poured and the moist cast material comes in contact at these points with the dry plaster of Paris of the impression, the latter draws the moisture from the cast material very much as a piece of blotting paper takes up the ink. This will very materially weaken a small area in the cast; however, when the cast is separated, it presents to the eye a smooth, highly-glazed surface. During the closing of the flask great pressure is placed upon the semi-plastic rubber, to force it into the details of the matrix such as the diatoric openings of

the teeth, around the pins and in the proximal spaces. Under this pressure this weakened area gives away, and rubber partially fills its place. When the vulcanized case comes from the flask there will be found many small round pin point or pin head balls of vulcanite scattered over the palatal portion of the denture. These necessitate scraping and finishing just at the point where the least possible change should be made.

CAST MATERIALS AND CAST CONSTRUCTION.

After the impression has been coated with the separating mediums, the boxing filled with water and allowed to stand for from five to fifteen minutes, a good coating of heavy soap suds has been applied and thoroughly rinsed, then we are ready to pour our cast, but before going further let us consider just what constitutes a good *cast material*.

At the very beginning it is to be said that the day is long past when there is any excuse for a dentist to construct his casts of plaster of Paris when he intends to vulcanize or swage over them. There are many reasons for this statement, any one of which, with but few exceptions, is alone sufficient to condemn its use for this purpose.

First let us consider *expansion* briefly. The subject of expansion has previously been discussed under the heading of impressions, and what was said regarding the expansion of impression plaster of Paris largely holds good for the better grades of cast plaster of Paris, namely, that it is comparatively unimportant when considered with the other defects. Of course no plaster of Paris should be used for casts which measure high in expansion.

Strength. Plaster of Paris does not have the strength to withstand the average pressure applied in flask closing. This statement has a meaning that is far more significant than the majority of dentists appreciate. There are very few operators who *know* how much pressure they apply to the face of the cast in closing their flasks. Dr. J. H. Prothero, of Chicago, was the first to figure out the pressure thus applied, although it is not a difficult problem in physics. He found that with fifty pounds pressure applied on the end of the ordinary flask wrench, using the ordinary one-to-twenty pitch flask bolt, exerted over *four tons* pressure per square inch on the face of the cast, or, to be exact, 8333.333 plus pounds. Granted that fifty pounds on the wrench in closing the flask is an excessive pressure, so is 8333.333 pounds; there are a great many dentists practising to-day who would be very much surprised if they but knew how nearly they approach this figure at times. Plaster of Paris will not stand this pressure, nor will any other known cast material, without a very definite change. This subject will be discussed further in a later chapter on flasking.

Third, and to the author by far the most important, weakness of plaster of Paris as a cast material, is what is termed, for the

want of a better name, its low *temperature* deterioration. By this is meant that during vulcanization the rising temperature starts deterioration, and that there is a direct ratio of progress between the deterioration and the temperature rise. It is a common experience among dentists to flask a denture and have the flasking plaster of Paris set so hard that it is difficult to trim it with a knife, but after the case has been vulcanized and the flask opened this same plaster of Paris is so soft that it can almost be removed by the fingers because deterioration has been so extensive. The author has spent considerable time in testing the different cast materials in an attempt to determine at just what temperature this deterioration begins and its extent during the process of vulcanization, but his tests have been more or less crude and his results correspondingly inaccurate. They are of value only from a standpoint of comparison. The author is of the opinion, however, that a large per cent. of the deterioration takes place before the temperature of 250°F. is reached, and that it is more due to confined steam penetration than to the heat. Above this temperature the super-heated steam assumes more of the nature of a dry heat, which is much less harmful than moist heat. When the vulcanizer begins to cool and the contained steam to take on its original moist characteristics, it acts very rapidly on the already partially deteriorated cast, thus completing the breaking down process. If this theory be true as past experiments indicate, it is very important, because while the cast is undergoing its initial deterioration the rubber is flowing or seating itself in the matrix under high pressure; in other words the denture base is being formed over a deteriorated, distorted, and broken-down cast. Vulcanization begins about 247°F., and begins in some materials, particularly plaster of Paris, as low as 215°F. It is therefore essential that the cast be constructed of some materials other than plaster of Paris.

In the past few years there have appeared on the market many different kinds of cast materials. Most of these are either plaster of Paris or cement compounds. No attempt is made to cover in detail here the characteristics of all these different materials individually, but it may be said that practically all of them are from any viewpoint an improvement on plaster of Paris as a cast material.

There are two materials that are very much alike, and both of which have given excellent results from the standpoint of testing and practical work. They are the Ransom and Randolph *Model Stone* and Healy's *Artificial Stone*. These materials have practically no expansion, test very high in strength, and have an approximate temperature deterioration of from twelve to fifteen per cent. at vulcanizing temperature. Other materials range from twenty to eighty per cent. The technique for working these materials is practically the same for each and is as follows:

A medium-sized plaster bowl and a stiff-bladed putty knife with the corners well rounded are best adapted for the mixing. In the bowl is placed about two-thirds of the amount of water required to fill the boxing, and to this add about two tablespoonfuls of the model stone. This is spatulated vigorously until an even, smooth mixture results. More model stone is now added until the mixture is very heavy or stiff. The putty knife spatula is now dispensed with and the material is worked by kneading it with the thumbs and turning the bowl on the laboratory bench. Another very good method is kneading the outside of the rubber bowl pressing the side inward and downward with great pressure and at the same time turning the bowl. More of the model stone should be added and the kneading continued until it begins to crumble into a more or less dry mixture. It is now taken into the hands like so much dough or putty, and kneaded thoroughly by pressing the hands together on the mass and sliding the palms of the hands in opposite directions, thus mashing up and mixing thoroughly any small particles that may not have been entirely incorporated in the mass. When it is thoroughly mixed it is formed into a roll and broken to see that it breaks with a clean fracture which indicates that it is of the right consistency. It is now formed into a roll and placed upon a clean paper on the laboratory bench. A small amount of the mixture about the size of the end of the thumb is now pinched off and rolled into a ball to drive out the air and this is placed in the centre of the boxing. This is now thoroughly beat or jarred into the fine lines and detail of the impression by one of the two following methods:

A felt or wooden wheel with one side flattened is placed on the screw chuck on the lathe and rotated at low speed. The base of the boxing is now held in contact with this revolving irregular wheel and the vibrations thus produced will jar the material to place. This is very hard on the lathe and in time will flatten the bearings on one side if continued.

The second method is to fold a cloth or paper upon itself until it is very thick and about five or six inches square. This is used as a pad and the boxing is beat upon this upon the laboratory bench or on the floor.

When the material is first placed on the boxing it will appear as a heavy, dry mixture but as soon as the beating or vibrating starts it will immediately start to flow and moisture will come to the surface very much the same as mercury will work to the top during the condensation of a dry amalgam restoration. As soon as this first bit of model stone has spread to about its limit another piece nearly the same size is placed directly on top of it and jarred down in the same manner. This is repeated until the boxing is completely filled. As soon as the impression is covered larger masses of the model stone may be added. It is important that the operator watch carefully the

first few pieces of model stone as they flow over the surface of the impression and make sure that all air is forced out in advance of the mixture from all the fine lines and detail of the impression, otherwise the surface of the cast may show folds in the material or bubbles that may cause much trouble.

The writer's experience has been that it is not advisable to make two mixes of the model stone in pouring the cast as some operators advise, namely, a very thin mix that is flowed over the surface of the impression and followed by a heavy or thick mix. Model stone, as well as other similar materials, when mixed very thin contracts when setting and also sets much softer. This can easily be tested by making such a mix and filling a metal ring or a test tube. When the entire surface of the cast is constructed of such a mix it will not only be found to be much softer, but the surface will also sometimes be found to be covered with minute cracks, and in extreme cases, especially where the cast is used for swaging, the surface will have a tendency to chip off and sometimes cause much damage.

Model stone when properly mixed can be separated from the impression with safety in from one to two hours, but it is *very much better* to arrange to pour the cast the last thing in the evening and let it set over night before opening. The freshly-poured cast never should be placed near a radiator or stove to hasten the setting, as any such unnatural heat will sometimes have a tendency to make the cast chalk-like.

When the model stone has thoroughly set, the technique for separating the cast from the boxed impression is very simple. The boxing is held upside down and struck with a hammer or mallet around the edge, breaking away the wax rim reinforcement. A few light blows on the edge will break away the base of the reinforcement. The wax rim is now cut through with a knife and peeled away. Holding the model stone cast, the foundation reinforcement is struck from above on the edge next to the modeling clay, and one quick blow usually is sufficient to remove this. The modeling clay is now exposed so that it is easily removed with the fingers. Next heat the tray compound tray over an open flame until it is very soft. Then remove it with an instrument or the fingers. Here the operator should avoid moist heat or dipping in water, because of the tendency of the moisture to soften or to cause the surface of the cast to deteriorate. At all stages of construction it is advisable to keep the cast as dry as possible. The plaster of Paris impression is last removed by flaking it away with a blunt or dull instrument to avoid cutting or scraping the cast. Next take a sharp knife and go carefully around all the margins and borders, rounding off and smoothing up all rough or feather edge margins and "dressing up" the cast in general. The only point at which this technique of separating may have to be altered is in the

removal of the foundation reinforcement from lower cases that may have high and prominent heels with marked undercuts in the region of the mylohyoid ridge. In such cases it often is necessary to trim the foundation reinforcement sufficiently for clearance to avoid fracturing the cast at the heels.

(To be continued.)

What Teeth Should be Extracted and What Teeth Should be Saved

DR. C. N. JOHNSON, CHICAGO.

Official stenographic report of Discussion following presentation of paper by Dr. Johnson as published in August issue of ORAL HEALTH.

DISCUSSION: DR. A. E. WEBSTER, TORONTO.

IN calling upon Dr. A. E. Webster to open the discussion on Dr. Johnson's address the Chairman expressed, on behalf of the Association, appreciation of the services rendered by Dr. Webster at each Convention. The delegation seconded this sentiment with the usual demonstration.

Dr. Webster then addressed the Convention as follows: Mr. President, Ladies and Gentlemen, and Dr. Johnson: I thank you very much for this kind reception, I only wish I could measure up to your enthusiasm. I deem it a great honor and pleasure to have the opportunity of discussing a paper so ably prepared by my old teacher. There were two men who stood out in my study days very highly—they were Dr. C. N. Johnson and the late Dr. Willmott. These two men were examples to me of what an educated gentleman ought to be in this life.

I congratulate Dr. Johnson; and I congratulate the Society for having this presentation this afternoon upon a subject which is very difficult, for nobody wishes to step out as Dr. Johnson has and say what he thinks. I remember when Dr. Johnson read a paper before the New York Dental Society at the time of the craze on analgesia. Everybody had to have an equipment. And I remember Dr. Johnson gave the idea that Dentists of skill did not need elaborate equipment for dissensitizing dentine. Dr. Johnson had the courage at that time when the stampede was for analgesia to stand out for balance and sanity; he has the courage to stand out to-day when the stampede is for extractions.

In the discussion of the subject Dr. Johnson did not get to very concrete problems, so that it leaves the question wide open for us to proceed as we please. He did make the concrete statement that he would not extract every tooth which shows a more or less rarefied

area at the apex. I believe that the sane general practitioner will concur in that. Now why should anybody concur in that in the face of such evidence in the opposite direction? Well, no person has practiced dentistry for a number of years without having recognized some of these teeth which showed rarefied areas having recovered and the patient having good health over a period of years. The most significant thing I have seen presented was that by Dr. Charlie Pearson before the Academy of Medicine, when he showed that the ordinary treatment had cleared up and what had appeared to be an abscess at the end of a root, and remained healthy over a period of twenty to thirty years.

Now then, on the other hand, you will notice Dr. Johnson was very careful to say he did not have any quarrel with the man who believed that teeth caused systemic diseases.

How shall we deal with border line cases? I believe in dentistry we have not proceeded logically or properly in this regard. The dentist sees what he is going to do and decides it in about two and a half minutes, while the general medical practitioner will spend days and days in reading up before he will come to a conclusion, while we come to a conclusion in a few minutes. Surely ours is a shot gun method of diagnosis. We must do better than that, and in order to do better, I believe there is no plan better than what has been established in medicine for a number of years. They proceed in an orderly way and make a diagnosis. We treat without a diagnosis.

So we start off then with the idea that we will take a family history. If we are going into a case at all, we will take the general history of the patient. The Dental History will involve:

The condition of dental caries,

Periodontal disease.

Deformities and

Accidents.

The medical history you will get in consultation with the physician.

After we have made a general diagnosis we may proceed to determine the dental aspects, and the most important of all, after dental caries, is the condition of periodontal membrane.

When a patient is sick and sent to a dentist because of some illness it is the dentist's duty then to enquire or to know from the physician from what disease the patient is likely suffering, and in full knowledge of that proceed as he would with an ill patient, not proceed as he would with a healthy patient.

Now Dr. Johnson did not limit his patient; in some cases the tooth with the rarefied area at the end ought to be removed and in some cases not. If that patient should be suffering from tuberculosis,

syphilis, chronic rheumatism, anaemia and perhaps diabetes, the tooth ought to be removed. These are properly classed as really serious systemic diseases and teeth under those circumstances should not be left even on suspicion.

Now I have classified here a few of the conditions under which teeth ought to be removed.

Extract every tooth from which infection cannot be removed and the tooth made comfortable and useful. If the tooth continues to be infected and the patient is not normally healthy or it cannot be made useful and comfortable, then remove the tooth. I am making these specific so that you may discuss them.

Extract all teeth which serve no useful purpose in the mouth. Occasionally the Upper or Third Molar is such a tooth. Now occasionally it is not. Keep that in mind. It may serve a very valuable purpose in holding the second molar from drifting distally or retaining a denture or bridge.

Extract every tooth with Pulpitis whose pulp cannot be removed and the canals properly filled as may occur because of position, location of the tooth, or because of anatomical form of the tooth or physical condition of the patient.

Extract every tooth which is the seat of acute apical periodontitis or peri-apical abscess if the pain is intolerable and cannot be otherwise relieved, or if there are grave systemic symptoms or if there is reason to believe that there is such a destruction of the periodontal membrane that the tissues will not return to a normal condition.—Example: Upper lateral, Incisor carrying a porcelain crown. I would not bother taking that crown off if there is periodontal membrane destruction.

Extract every tooth root which has been the seat of one or more acute infections or a chronic infection extending over some years which has detached and considerable portion of the periodontal membrane or rendered the tissues of the root dark or grey in color.

Extract every tooth from which there has been lost by disease a half of the periodontal membrane, beginning at the apex.

Extract all teeth with exposed pulps, infected teeth or painful teeth for patients suffering from syphilis, tuberculosis, endocarditis, general septicemia, severe arthritis, severe anaemia or diabetes. Extract every tooth with a dead and infected pulp whose root end is not normally closed, except upper incisors, because as Dr. Johnson has explained, these may be successfully treated. You know in years gone by when Dr. Sparks came here to the Ontario Dental Societies and showed models in which he said you should extract some sound teeth for the advantage to young patients, and there are some to-day who are of the same opinion. I wish to read this as having been presented by one of the staff of Orthodontists of our School:

EXTRACTION OF FIRST PERMANENT MOLARS.

"If the deciduous teeth are in place and will hold the bite in normal separation, and the second molars have not erupted and two lower first molars and one upper first molar must be extracted then remove all four, or if two lower first molars are to be lost remove all four, but if two uppers are to be lost do not extract the lowers."

Why? The lower teeth are the guide to the uppers. They come in first and direct the uppers to their position.

"If two molars on the same side must be extracted do not extract the teeth on the other side, but if a molar on the lower left side must be lost and one on the upper right side, extract all four. If the only teeth keeping the bite open are first molars, retain them until the bicuspids or the second molars come into normal position, then determine whether to extract or not."

You see, interpolated Dr. Webster, if the first molars are keeping the bite open then do not remove them until the second molars come in, then determine what to do.

Dr. Webster continued: Before teeth are extracted it should be known that they are the cause of disease either local or general. Let us get *that*: before teeth are extracted they must be known to be the cause of disease either local or general. If we would just stay there we would not take out so many teeth. No physician or surgeon would be blameless if he recommended the removal of the appendix, the foot or the hand because of suspicion. A diagnosis would have to be made before action, but when it comes to the teeth hundreds are extracted daily on suspicion only. Often without either Dental or Physical examination.

Patients sent by a physician to a dentist for dental examination should carry with them a report which would indicate what physical ailment they complain of, because the kind of dental operation depends primarily upon the physical condition of the patient and secondarily upon the anatomical form and position of the tooth involved, the age, sex, occupation, and the state of the periodontal membranes of the teeth help in the determination.

A dental diagnosis involves a complete understanding of the fundamentals of health and disease just as much as a diagnosis of the condition of any other part of the body. There is the family history, the personal history, the history of the present complaint, the Dental history past and present. Occasionally both dentists and physicians act as if there were only one of two things to do—extract a tooth or fill it. When it has been determined that a tooth is the seat of infection and the periodontal membrane is good enough to warrant the retention of the tooth there are several methods of practice open each of which will relieve both local and general symptoms. The choice of method is of some consequence because upon it, success or

failure depends. It is the condition of the membrane that determines the method. If the canal is freely opened and the apical opening normal and little soft tissue involved as revealed by the history and the X-ray, then the simple medical treatment which we have used for 40 years is indicated. If the periodontal membrane is not stripped from any considerable portion of the root-end, though there is extensive involvement still, medical treatment is the best.

Now you know we get an idea that because there is quite a large involvement that the tooth must be removed. Not necessarily at all. It is the involvement of the periodontal membrane. Outside of the periodontal membrane there may be considerable involvement.

The satisfactory results obtained in cases of known general disease, by Dr. C. E. Pearson, Toronto, shows at once the value of this old and tried method. The establishment of a sinus, so infectious materials may be washed away, is effective where the disease has been long standing. Curretment is suitable if some membrane is involved and of long standing. All root-ends denuded of membrane should be cut off. I don't believe in that grand-stand thing of cutting about half the root off, there is not much left to hold the crown. But I believe that curretment cure systemic diseases as much as if the root was removed.

As a rule general diseases are more liable to follow chronic, apical infections of teeth than from a similar amount of infection found around the necks of teeth. Many extensive gingival infections cause little or no disturbances, while in a few notable cases marked systemic affection have cleared up and from local treatment, about one or two teeth. While it is true there are many errors in diagnosis of the condition of the apical tissues, it is equally true that there are more frequent errors in diagnosing the condition of the gingivae tissues.

DR. JOHNSON—CLOSING THE DISCUSSION.

Dr. Johnson then closed the discussion, expressing himself strongly that under conditions, that the patient was suffering from some real deadly disease, he would not hesitate about removing suspicious teeth. I would not pose, he said, as placing the welfare of any patient in jeopardy because of the retention of a tooth. What I complain of is this, and I am not criticizing the dentists or medical men, but there has been in the last few years a routine that is exceedingly trying to honest conscientious members of the Dental profession, and I will give you one illustration. I don't like to recite cases, but, I could stay here all day and recite cases that are a disgrace to medicine and dentistry.

Dr. Johnson then related that because of a statement he had made that X-ray pictures were not always conclusive evidence he had been deluged with letters from all over the country, and incidentally a friend from Denver had recently sent him along with the radiographic evidence, the statement that a medical man said this patient must have some teeth extracted. This friend told Doctor Johnson that the

patient had undergone a physical examination by the physician and was found normal. But the patient had said: "Recently I have lost my pep a little." The X-ray man had sent him to the physician and the physician had sent him back to the dentist. The evidence and history, said Dr. Johnson, was sent to me and I said: If those teeth were in my mouth I would leave them there. I said: You better tell your patient to look after his diet a little bit, get some exercise and forget it. I did not think my friend would show the letter to the patient. However he wrote me and said: You know I showed your letter to the patient. He came into my office, feeling dumpish, and when I showed him your letter he braced up and went out of the office feeling fine. Not only that; I showed it to the physician, who said: "That is a common sense view of that patient." Ninety-nine physicians out of a hundred, said Dr. Johnson, would have said his lack of ambition was due to those teeth and he must have them out. Now it is cases of that kind that I am complaining about; I do not look lightly upon a grave affection that is likely to end in the death of the patient, but I tell you, gentlemen, it has grown to be a habit with too many physicians to condemn the teeth when there is some slight ailment without looking farther for the cause, and patients have had so much harm done them in this way it is getting to be my religion to fight that thing. I think it is about time that the Dental profession had soul and conscience and were willing to stand up for their convictions.

Dr. Johnson then further related how, after expressing himself strongly to this effect at a meeting at Chicago one night, an ex-president of the Chicago Dental Society came up to him and shook hands and said: "I am awfully glad you said that thing." I said, he continued: "What is the matter with you." He said: "I feel the same way about it, so do others, but we have not the courage to say so in public." He said: "I feel strongly about it, they got five of my teeth. I was having some trouble with my feet, and the physician looked me over and said: 'Those teeth of yours, you have to have them out.' " I had them out, and after allowing a sufficient length of time for the effects to make themselves felt, I went back to the doctor and told him it had not helped me at all. I said: Doctor, I want to tell you something, so that you may not make the same mistake again: having those teeth out has not helped me one particle. Do you suppose that phased him? Not for one moment. He said: "Then it is your appendix." I said: I had it out fifteen years ago. He then said: "It is an abscess in your kidney." Well, I said: Doctor, I came to you with the best of spirit to try and give you some light upon the subject. You can't put a knife in me.

Well, he said: I went to a shoe man who fitted my feet properly with a shoe and I have been comfortable ever since.

Those are not isolated cases, continued Dr. Johnson: they are

repeated hundreds and hundreds of thousands of times, and I want to tell you the public has been exploited by the medical men and the dentists till it has put me in the mood where I feel like fighting the battle for the patients. On the other hand I will not allow in the patient's mouth a tooth in which I can come to the conviction, after the kind of investigation that Dr. Webster has mentioned, that the tooth is a menace, but that does not mean that I will take the physician's "Say so" when he writes it upon an order and gives it to the patient, without due deliberation. There is not a medical man knows and there is not a dentist knows some of these border line cases, and it is these border line cases which we ought to take to heart, and there is a rule which I have tried to follow out in these cases: "How would you feel about that if it was in your own mouth?"

This winter there was a gentleman who was known from one end of the country to the other, one of our best literary men, who began to feel like the patient in Denver—he was losing his pep a little. They got at him with some X-rays. One of his closest friends, a physician in Chicago, ordered some teeth out. He came into my hands. I told him I did not agree with the diagnosis. That man told me this: I happen to know this man so that I can call him by his first name. I said: You are an older man than I am by many years, you have a whole lot of pulpless teeth in your mouth. Why don't you have them out?

The physician merely smiled and shrugged his shoulders without comment. The attitude towards tooth extractions is often vastly changed if the tooth happens to be in our own mouth.

Child Psychology in Relation to Dentistry*

M. EVANGELINE JORDON, D.D S., LOS ANGELES, CAL.

A NORMAL child never needs to know pain from his teeth. When the teeth are to be shed, they drop out as naturally as do those of a young dog. If his teeth have been diseased, but have been properly treated and filled, the roots will be resorbed and the teeth drop out in the same painless way. If the roots are bathed in pus, they will not be resorbed, but must be extracted, and the pain of extraction is the one that children most fear.

In working for children every operation should be as carefully carried toward a successful completion as if the work were in a permanent tooth, because the conditions of the youthful mouth predispose the teeth to the ravages of caries. Also the laity have been led by the dentists themselves to think that deciduous teeth are transitory and

* Read before the Colorado State Dental Association, Glenwood Springs, June 20th, 1924.

more or less worthless, consequently not to be repaired seriously. If we are going to fulfil our obligations as conservators of public health by proper care of the teeth we must prepare ourselves to do consecutive work for children from the first or second year.

The dentist who attempts to work for children must prepare himself for the task. Before having worked for children many dentists express themselves as "Not having patience with children" or "Disliking children," but after one has made a sincere effort to succeed he will never again express himself in this way. He may have to call upon a reserve of kindness and patience that he does not know he possesses, but when the work is completed a feeling of satisfaction will repay him for the effort he has made.

To the average dentist the management of a crying, hysterical child presents one of the most difficult problems in child practice. The dentist's office carries with it more emotional stimulation than almost any other situation in the life of the average child. The younger the child the more serious is the problem of controlling the situation. To the person who has made a careful study of children, the problem is very simple.

At heart every true man loves children, and after he has once rendered a valuable service to a suffering child he will be ambitious to try again to see if he cannot be more successful with the next one.

Seldom does an operator take up children's work because he loves children, but because it is often the best opening offered. I have never known a dentist once having *successfully* practised for children who was willing to take up general practice. The variety and charm of *preventive* work soon draws the children's dentist into closer touch with the family problems and he exercises an active concern in the future health and welfare of each little patient. He soon forgets the struggle he had in treating the abscessed teeth in the mouth of a two year old, by watching the renewed health and growth of the little one, and, as years pass, how anxiously he awaits the eruption of the permanent teeth replacing the treated ones. Watching growing things is a most entrancing occupation, as any gardener will tell you, and watching children grow in the garden of children's dentistry repays one for all one's anxiety and nerve strain.

The bearing of the dentist is of great importance. He must radiate comfort and intelligent confidence to the child as well as to the parent. His attitude must be that of a kind, cheerful, understanding friend.

The dentist should feel the *profoundest responsibility* as to the impression he will make upon the mind of the child. It may mean the future dental health of the child, or if he fails to impress the child it may be impossible for that child to trust a dentist again. I once had the care of a girl of fifteen who had been badly frightened while in

the dental chair at the age of seven. Some careless or unprincipled action of the man had given her such a scare that until she heard of a woman dentist she would never go near a dental office again. She confided to me that although she often suffered from toothache (she did not have a sound tooth left and the first permanent molars were a mass of broken roots) she would conceal her suffering rather than be again insulted. Whenever she thought of going to a dentist so strong an emotion was aroused that she was unable to overcome it and so endured the suffering.

It is an established psychological fact that early emotional experiences have a permanent effect on a person's attitude toward a specific situation. It is even true in many cases where the person is not aware of the original cause. This is particularly true with regard to dental operations, and consequently the person working for children has an increased responsibility.

The above story shows how necessary it is to have an attendant at the chair, as with some neurotic types the imagination or misinterpretation of actions might cast a serious reflection upon the name of the dentist if the child carried away such a story. An attendant or nurse is always necessary in handling children. She must be discreet and not make personal remarks about the child. An indiscreet nurse had finally to be dismissed, after repeated warnings, because she remarked about the sunburnt condition of the knees of a little girl of nine. The child cried because she was just beginning to be sensitive about her personal appearance. A discreet, intelligent and patient nurse is particularly necessary in handling neurotic girls.

In the waiting room the child and his parents are received by a sympathetic, understanding secretary who offers him toys and books with which to beguile the period of waiting. The attitude of the happy little patients, who are waiting their turn, puts him into a psychological frame of mind to enter the operating room in a receptive mood.

The effect of children together in the *operating* room is very beneficial. A nervous child coming into a room where there are other little children in the operating chairs has much greater confidence in placing himself in the hands of the operator.

Timid little children are often brought with older brothers and sisters and allowed to sit in the operating room (without mother or nurse) two or three times before any work is attempted for them. In such a case the child in the chair is put upon his honor to be good and not frighten his little sister. Sometimes the reverse happens, as the following story shows:

A badly frightened five-year-old boy, named Dick, had to be held during his first appointment (in the manner described later) until, seeing he was not hurt, he became a very good patient. When he

came for his fourth appointment, his nine year old brother also came for work. Dick noticed that his brother moved in fear of the engine and said to him, "Why, Harold, do you think I would do that?"

As your patient and his parents come into the operating room, study the attitude of the parents to the child and the attitude of the child to the parents. It often gives you a clue as to the nature of the child.

Each child must be studied as an individual. Some understanding of psychology is valuable because the treatment must vary according to the classification to which the child belongs.

First we have the mental classification.

1. The characteristics dependent on intelligence.

(A) Feeble minded or mentally defective (arrested development).

1. Idiot.
2. Imbecile.
3. Moron.

(B) Border line.

(C) Normal.

(D) Superior.

1. Precocious (ahead of years).
2. Genius (exceptionally bright).

(E) Peculiar (not responsive to the ordinary training given children. He does not develop well under it.)

II. Instinctive (that is controlled by the instincts or emotions). Emotionally unstable.

(A) Nervous.

(B) Fearful.

1. Stubborn.
2. Sullen.

III. Psychopathic.

Hysterical.

Epileptic, etc.

The child who is mentally defective or of borderline intelligence is generally in need of dental care because the efforts at home to keep him upon a sensible diet and to keep his teeth clean are not successful. He is much more difficult to handle, as his reactions are to more primitive stimuli. His behavior is like that of a wild animal in captivity. He displays all the traits of the emotionally unstable and may be nervous, hysterical and stubborn because of his fears. Under five such children must often be held during the entire period in the chair for necessary work; when over five it is often possible, through patience, to win their confidence. One such boy at the age of eight clung stubbornly to a large arm chair in the operating room and refused to get into the dental chair. When an attempt was made by

the nurse to put him in the dental chair he scurried under the armchair like a little wild animal. He was finally persuaded to have an aching tooth filled with cotton dipped in carbolyzed resin* while standing before the armchair in which I had seated myself. He derived so much comfort from that, that the next day he was persuaded to sit in the dental chair while the dressing was replaced. In a few days I was able to go on with his work in quite an ordinary way and he continued to come regularly until his fourteenth year. He often declared that he loved me and knew I would do nothing to hurt him.

Another such case had an obsession that he could not spit into the bowl, and I won his confidence by always having him lean sideways over the bowl, when washing out his mouth, and let the water drip into the bowl as I do with a child under two.

A mentally defective child is more suggestible than a normal child, that is, you can control him more easily by suggestion. But the attitudes of the mentally defective, or even of the normal *young* child, are much less permanent than those of normal. He must be repeatedly reassured and must at all times be guarded with greater care. He must see and hear nothing that will frighten him while in the dental office. Such a child should never be brought into the operating room where a patient is crying or showing any other undesirable emotion. It immediately suggests to his mind painful impressions. For the same reason no child should ever be allowed to leave the operating room while crying, or he will leave an unfavorable impression upon the mind of some such child in the waiting room. Where a child is crying at the end of an operation it is best to recall the parent and have them remain in a dressing room until the child has regained his composure.

Very few psychopathic children reach the hands of the average dentist. If such a case does come for dental work it should be handled in conjunction with the attendant physician.

As civilization becomes more complex the child reacts from more than one stimulus. The normal child who has been told fearful stories of the dental office reacts to nervousness and fear, and until reassured is often difficult to control.

Children when brought to the dental office must also be classified as well or ill.

A child when well, if mentally normal, is easily handled, but the same child if ill from a night or two of sleepless suffering is apt to display fretfulness, restlessness, indifference, nervousness or timidity which will greatly tax the patience of the operator.

Children must also be classified as to age.

Under the age of three the attention may be diverted, but little can be done through reasoning. Over the age of three to the mentally normal child operations may be explained in a simple way and the

* Fletcher's Carbolyzed Resin.

attention held. When the age of five or six is reached pride may be called upon as an aid.

The home training of the child is reflected in his behavior in the office. A well trained, mentally normal child, even if timid, tries to overcome his fears, but an undisciplined child makes no such effort. If in good health the first child will be seated in the chair without trouble. The second child often shrieks and clings to his parents and nothing can be accomplished until he quiets down.

A girl of eleven of the first type came to us because she was so frightened she would not go to a dentist in general practice. She was to have a tooth prepared for an inlay. She asked whether it would hurt or not. The operator said, "I do not know, Evelyn; with some children it does and with some it does not. You will have to decide whether you would rather have it hurt now and save the tooth or let it decay, suffer toothache and lose the tooth." Evelyn thought a minute and said, "It is better to have it hurt now and save the tooth."

The second type is illustrated by a girl of the same age who acted very badly and finally bit the fingers of the operator, whereupon she was given a sharp tap on the hands, which so surprised her that she settled into good behavior. Several days later the operator said to her, "I called your bluff, didn't I?" and Dorothy answered, "I could have bluffed if I had tried hard enough." Dorothy has conceived such an admiration for the operator that she is not willing to wait two months for her regular prophylactic treatment, so on one occasion told her mother she had lost a temporary filling, which on examination was in perfect condition, so that she could come at an earlier date.

Do not assume from the above story that I believe in slapping children. I believe very much to the contrary. Very rarely with the undisciplined, mentally normal child or with the emotionally unstable hysterical type, a sharp word, a tap upon the interfering hands or a little shake will work wonders in diverting the mind of the child; but remember that such discipline must never be given without the full *understanding* and *consent* of the parent.

When the small child is seated in the dental chair, attract his interest through the celluloid ducks and fishes that swim around in the cuspidor. Most normal children are very reasonable, and a quiet explanation of the nature of the work with the assurance that it will be done with as little pain as possible generally enables the operator to continue without difficulty. Many children under three years *always* cry, but most of them very quickly lose their fears when their attention is engaged. Mentally defective children must be classed with infants and must often be worked upon when crying; great patience and skill is necessary on the part of the operator to do lasting work. In such cases the parents must understand that more time must be taken and the fees accordingly must be larger.

For the child between three and six, it is often necessary to allay fears. This is especially true if there has been a previous experience of a surgical or dental operation, which has left a painful memory. If a normal child will not listen, but keeps crying and struggling, the following plan has never failed: explain to the parents that you will hold him until he stops crying, and dismiss them to the waiting room. With the right hand, hold a folded napkin over the child's mouth so arranged that it does not cover his nose, place the left arm around his head, and with the left hand *gently* but *firmly* hold his mouth shut. His screams increase his condition of hysteria, but if the mouth is held closed there is little sound, and he soon begins to reason. Have the nurse hold his hands and feet. Tell him in a low, gentle voice that nothing is going to hurt him and that you will take the napkin away as soon as he promises to be good. After he has cried for a few minutes and begins to relax, ask him if he will be good. If he assents, immediately release him and give him a drink of water, but if he has been badly bred or belongs to the emotionally unstable class and his fears make him appear of a stubborn disposition, it may be necessary to hold him several more times before he finally gives up. As a rule, such children when they find they are not hurt make the best patients. It is often necessary to tell the child that you will hold him until he is good, even if it takes all day, but you are sure he will not want to keep his mother waiting so long. Many cases do require from a quarter to a half hour to calm down before you can finally remove the napkin. One child who was disciplined *forty-five minutes* in this way is now one of my best little patients. If you win the struggle, impress upon the child that his welfare was your only object and that you are not in the least angry with him. If you give up without doing any work, the *child* has won the victory and you can never succeed with him. The worst feature of your not having been able to convince him that the work will not hurt, lies in his impression of having won a victorious struggle. This will make it doubly hard for the next dentist; or perhaps the disheartened parents will give up; then the subsequent ill health of the child should justly be laid at your door.

Many parents come to the office in a very nervous and fearful condition, and they have the worst sort of influence upon a thoroughly frightened child. If the parents could only be made to realize their responsibility they would change their attitude before the child and not constantly suggest fear and pain. Every dentist knows how often he has heard the parent say in the hearing of his prospective patient, "I don't blame Tom for being frightened. I am a perfect coward in a dental office myself." Or, "I just hate going to the dentist." Before doing any work the child of such a parent must respond to the suggestions of the operator that there is a difference between dental offices and that in this office special care is taken not to hurt children.

Almost every child is more self-reliant and will listen to what is told him if the distracting influence due to the presence of the parents is removed. Such a child, as soon as the parent is out of the room, will often stop crying to see what will happen next. Often before the appointment is over, he may be telling you of his pets at home.

Discipline the child to keep the hands always upon the arms of the chair. Until he learns this valuable lesson, it may be necessary for the nurse to hold his hands there. This prevents snatching at the instruments, a proceeding which is very dangerous to both the child and the operator. Some dentists, not understanding child psychology, may think that teaching a child to put his hands upon the arms of the chair would cause him to grab them and become rigid. The reverse is the truth for a child under kindergarten age and often for an older child. The nervous, frightened young child grabs and clings to *persons* and not *objects*. The minute the child learns that he must keep his hands on the cool, white porcelain arms of the dental chair, he instinctively relaxes. An older child may grip the chair or wring his own hands, but he generally stops when the operator explains that if he will relax, the work will not hurt so much. I tell a very small child that the work doesn't hurt when he keeps his hands upon the arms of the chair, as it is a well-known fact that pain is much less when endured with relaxed muscles.

One day an operator said to a twelve year old, "Jack, relax." And as he did not respond she said, "Do you know what relax means?" "Sure I do; it means to hang limp."

This disciplining must be done in the absence of the parents. If you do not have their confidence and co-operation, *do not undertake the work*. Just as a teacher must have children under her absolute control in school, for discipline, mental and physical, so also must the children's dentist have them under control if he is to be successful. Young children have not as yet had school discipline, so some explanation to the parents of this phase of the work is often necessary.

One of the secrets of success in the management of small children is to treat them as if they were grown up. After the first visit, the child of three is expected to come alone from the waiting room, down a hall, and into the operating room. I am often greeted with: "Oh, I'm a big man. I'm not afraid to come in alone." One small boy, coming from his second appointment was dragged in kicking and yelling by his mother who then left the operating room. After putting in a filling the operator said, "Are you not ashamed to act like a baby, Fred? Will you promise to march in by yourself like a soldier next time?" He promised. At his next appointment he came by himself and said, "I am coming like a soldier this time." His good behavior continued from then on. When discharging a patient he is expected to carry his chart to the secretary, and often some tiny tot will come

and say, "You didn't give me my chart to take to the secretary"; or as some little people call it, "my ticket." This development of self-reliance is very noticeable in the absence of the parent, especially if the child is one of the spoilt baby type.

The co-operation of the child may not only be of assistance in an operation, but may occupy the mind of a child. One very nervous five-year-old boy would begin to kick each time I used the dental engine. I explained that every time he moved his legs the rest of his body moved, too, and that when his head moved it was dangerous as the bur might hop off the tooth, where it was at work, and somebody might get hurt. Paul answered, "I can't help it, they move themselves." "Then, Paul," I remarked, "next time they kick just give them a good slap and see if they won't behave." He sat more quietly, so I continued his work and had forgotten the conversation when suddenly I heard a loud slap, which greatly amused both the nurse and myself. Trying to keep a sober face, I asked Paul what had happened and he answered, "My legs wouldn't keep still so I just made them." And they did keep still, too, after that. Children are very sensitive to ridicule and if Paul had thought we were laughing *at* him he would have lost his co-operation in disciplining his unruly legs. You can laugh *with* children, but never *at* them except as a spur to their pride. Occasionally an undisciplined larger child will come into the operating room and begin to misbehave when there is a well-behaved small child in the other chair. In such a case, if you laugh at him because he is so much more of a baby than the little girl who is having her teeth filled, it frequently makes him ashamed and increases his good behavior and self-control.

Treating an older child as a man, asking his opinion, deferring to his judgment as to what he should think would happen under certain conditions, is a prod to his pride. With a child over six I try to impress upon his mind that he is an individual and that his teeth are his personal possessions. If they are destroyed or lost through his carelessness it is his loss and he is the only one that will suffer; he will be handicapped through life if his teeth are in such an unhealthy condition and he cannot grow to be a large, strong man. The ambition of nearly every boy to be an athlete is a great spur to his pride in doing everything possible to build up a strong, healthy body. In the same way girls may be made to understand that no matter how beautiful they may be in every other respect, eyes, hair, etc., if their teeth are ugly because of neglect they can never grow into beautiful young ladies, which is generally their ambition. If they insist upon eating candy and destroying their teeth, their digestion will suffer, their skin may become cloudy and rough, and their eyes and hair will lose their shine and sheen.

With the precocious child it may be necessary to pursue different

tactics. Where he has been told at home how much he will suffer if his mouth is neglected, much more may be gained if the operator will hold before his imagination a picture of the benefits to be derived.

In working for a child the operator must be very alert to signs of fatigue, pain or fear. If there is increased restlessness, or if the child appears to be suffering unnecessarily, it is wise to curtail the work, call the condition of the child to the attention of the parent and suggest mild home remedies such as a laxative, simple diet, warm bath and a few hours of daylight spent in bed. In some cases where there is a marked change in the behavior of the child, and if there are symptoms of nausea and fever, the child should be sent to the family physician, for such symptoms may be the forerunner of any of the childhood diseases. This is particularly true of measles.

It is necessary to prevent a child, ill with any disease, from mingling with the healthy children in the waiting room. I believe so firmly in the necessity of this that once during an epidemic of osteomyelitis (infantile paralysis) I advised all the parents of my patients to keep their children in their own yard and not take them on the street car or into any public building, and I closed my office until the city was pronounced safe. Particular care should be taken with regard to influenza, whooping-cough and measles. I make it a rule that no child be allowed to cough in the waiting room. Occasionally a mother may object and say, "Oh, I'm not afraid for my child"; but my answer is, "I am responsible for the children under my care and I cannot conscientiously see them subjected to contagion." It is mothers like the above who refuse to report disease and who let their children, when sick, be amused by the healthy children in the neighborhood, little caring that the neighbor child may gather the seeds of disease that will shorten and embitter his future life.

In studying the child try to find what appeals to him most. Possibly he is fond of animals and you can have a conversation about the teeth of his pet dog or cat. One little girl under three insisted that I try each instrument upon the mouth of a fish and the bill of a duck, and then was quite willing I should use it in a cavity in her tooth.* In this way she was impressed that it would not hurt her.

Another little girl continued to cry during operations, no matter how I tried to divert her, until her sister told me she was fond of cats. I had a china cat about an inch long which I told her she could hold in her hand if she would be good. From that time on she submitted to the necessary operations without complaint, and, while working, I told her all the stories of cats and kittens I could think of or invent. A small boy was given a little tiger to hold. The operator said, "If you are brave enough to hold a tiger you are not afraid of a little buzzy bee," as the bur is called in the office. Many children may have

* The animals were celluloid and had been sterilized.

their minds diverted in this way, and a large stock of animals of celluloid, wood or pottery, are indispensable both in the waiting room and in the operating room.

The voice is one of the best instruments in our equipment for handling young children. They are as susceptible to its variations as are animals. This is another reason for excluding parents from the operating room. An excitable parent who keeps raising her voice excites the child. The exercise of crying increases the circulation of the blood, and this intensifies the pain if there is pulpitis.

Stories told during an operation have a very beneficial effect. Under three years, stories such as "Goldilocks and The Three Bears" or "Little Red Hen," simply told, will generally hold the attention; but after that age rhythmic tales told in rhyme, such as those found in "The Giant and Other Wonderland Stories" have, in my experience, brought the best results. One six-year-old said, "I don't feel the 'picks' and the 'buzzy bee' when you tell me a story." One of the stories beginning, "Oh the Soldiers are never afraid,"* is long enough to hold the attention while a cement filling is setting. This is a great advantage, as the sustained interest checks the saliva which, in a nervous child, may be so increased in flow that it interferes with and prevents a successful operation. Well told stories will linger in the mind of a child for years and I often have a boy, coming for oral prophylaxis, ask if I will repeat some of the stories I told him when he first came—then only a tiny child. Children often bring their little companions for dental work so that they can hear the stories. The child's mind is very open to the suggestion that the work does not hurt while he is listening quietly to the story. As he is relaxed and his mind is occupied with the story, his imagination has no opportunity to conjure up fears that poison the blood, and so he does not suffer.

Children like rewards and can often be kept quiet while being worked upon by the promise of a present at the end of an appointment. The books gotten out by the Metropolitan Life Insurance Company, Colgate and other manufacturers, all play their part. This brings to mind the story of a small boy. In the pre-war days, when two small celluloid dolls only cost one cent, I used them to reward the good behavior of small girls. One day the sister, Mary, had been given a doll which she lost on her way home, so I gave her another one after good behavior during the long appointment. When John's simple filling and prophylaxis were finished and he was about to leave he said, "You always give Mary something when she comes." Taking the hint I gave him a little red box. At his air of disappointment I asked if he did not like it. Pointing to a collection of Indian

* From "THE GIANT AND OTHER NONSENSE VERSE" Albert W. Smith, Publishers—Andrews & Church, Ithaca, New York.

weapons decorating the wall he said, "I would prefer the bow and arrows."

The first few appointments should be short, not exceeding fifteen minutes. The first two or three at least should always be painless; because after the impression that dental operations do not hurt is fixed upon the mind of the child, little difficulty will be encountered. His attitude will be determined by the first few experiences, and after that a single painful experience will only be an incident; whereas, if the painful experience comes first, his attitude would be fear toward all dental operations. This is particularly true with extraction, which should rarely be undertaken until a favorable attitude of the child toward dental work has been established.

After the child has become accustomed to the work, the period may be lengthened to one-half hour or longer, although it is seldom wise to work longer than that for a young child who soon becomes weary. With weariness an element of fear creeps in, making it more difficult to work at the next appointment. Never work so long, for a child, that his courage breaks down.

With many children a morning appointment should be made, as their resistance is much greater then than after they are tired from a day of play or attendance at kindergarten or school. This is especially true of the nervous or delicate child, for whom it is very unwise to operate when his courage and resistance are greatly lowered. Difficult work such as the preparation of permanent teeth for gold inlays, or the treatment of root canals in permanent teeth, should never be undertaken after school hours because the vitality is at too low an ebb. It is a well established fact that a child is at his best between ten and twelve in the morning and between one-thirty and three in the afternoon. This is to be kept in mind when making appointments for children who are physically below normal. When a young child having several abscessed deciduous teeth, is brought to me, and if his resistance has been appreciably lowered, it is often necessary to have his parents take him out of school, keep him out of doors in the sunshine, and give him a very nourishing diet, until the teeth begin to respond to treatment.

When many operations are necessary for a young child, it is often wise to complete only such operations as teeth involving pulp treatment and the filling of the largest cavities, so that he can masticate with comfort, and then give him a rest of from two to six weeks before filling the smaller cavities.

In conclusion let me emphasize again that everything should be done to *gain* and to *keep* the confidence of the child. The parents must not be allowed to deceive their child with regard to dental operations; and, in all dealings with the child, the dentist must be calm, firm, truthful and kind.

Some Phases of Dentistry for Children*

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WHEN I accepted the invitation to present a short paper to this Society upon the subject of "Some Phases of Dentistry for Children," it was not with the idea of being able to tell you very much that was new, but rather to lay emphasis upon a few points which the profession is likely to neglect in its Public Health propaganda.

I approach a gathering of this sort in all humility, realizing that I am somewhat junior in the matter of years in practice, but for my observations and facts I have drawn upon eight months' experience at Forsyth Dental Infirmary for Children, Boston, and three and one-half years in the Pre-school-Age Dental Clinic of the Massachusetts-Halifax Health Commission, which is held three forenoons per week at Health Centre No. 1, Halifax. In this clinic we deal exclusively with children under six years of age. (Lately we have done a little with some seven year old children.) So, this morning, when I mention *children*, I refer to those not over seven. A great advantage in doing this work lies in the fact that the visiting nurses and housekeepers of the institution can check up the work I do, between the children's visits to the clinic.

A big problem presents itself in child dentistry, in trying to break down the idea, which has so firmly fixed itself in the minds of the laymen, that deciduous teeth are of no consequence as they last only a short time anyway, so why spend any money or worry upon them? It has frequently been told me by mothers in the clinic that their doctors, and, I am sorry to say, their regular dentists, are of a like opinion.

We all recognize the menace of diseased or decayed permanent teeth. Professor Caird of Edinburgh, a noted surgeon, will not remove an appendix without first doing radiography upon the teeth. If this be necessary for adults, why not use special care where diseased teeth so often exist in a growing child, who requires all its energies to build up sound body tissue? The question of building sound body tissue is certainly the most important phase of dentistry. Nutrition of the teeth governs for the most part their decay. Normal healthy teeth will be formed and preserved by including in the diet each day the substances which make such teeth, and where decay occurs, the bacteria which have been thought responsible for it are not the primary factor, but the secondary factor in this destruction.

Prevention of decay of the teeth is not due to any extent to the presence of resisting factors to the destructive forces present in the

* Read before Nova Scotia Dental Association, July, 1924.

mouth, nor is it due to a "protective action" of an alkaline saliva; rather it is due to a scientifically balanced diet, in which calcium and phosphorus compounds and vitamins are in right proportion—found in milk, whole wheat, fresh fruit, and leafy vegetables. The diet which mostly affects the child's teeth, is the food the mother ate during the prenatal state. Many times, after examining a child, have I remarked to the mother, "You were ill during the seventh or eighth month, were you not?" Invariably the reply is, "Yes." If not, I find she lived upon foods deficient in tooth-building materials. Fortunately, practically all medical men who specialize in obstetrical work stress the matter of correct diet with their patients.

We owe much to the Research, in diet, done by Mrs. Mellonby, of the Research Council, England; Clarence T. Greeves, of Johns Hopkins; and Percy R. Howe, of Harvard.

Next to the matter of diet I would consider the most important point for emphasis to be the frequency of visits. Many adults have formed the habit of a dental examination about twice a year. This is a long way from the mark when dealing with children. I try to have the children at the clinic visit me once in three months and oftener if I find their teeth are poorly enameled. Children who come regularly and receive a good cleaning, and have all doubtful surfaces treated with silver nitrate, *never* develop any serious tooth trouble. Fifteen to twenty minutes is ample time for an examination and prophylaxis. Again I repeat that deciduous teeth decay so quickly, the frequency of visits should be emphasized at every opportunity.

At every visit the child should be questioned regarding its Oral habits. Very quickly it takes a pride in being able to say, "I clean my teeth three times a day." They readily learn the correct manner in which to use the brush and even at the tender age of three years, they learn to look after their own teeth.

The care of the six year molars presents a problem all their own. Invariably the mothers mistake them for deciduous teeth and neglect them accordingly, with the resultant needless loss of this class of permanent tooth. Supervision in this particular respect by the family dentist is invaluable. I endeavor to warn all mothers that if they see more than ten teeth in either jaw, to use extra special vigilance with the extra ones, as they are part of the permanent set. If these teeth are faulty, Silver Nitrate should be used immediately. If the grooves are too badly diseased for the use of Silver Nitrate alone, I fill them with soft cement.

Now, what are we going to do with the deciduous teeth which do require some operative work? As the matter of treating abscessed deciduous teeth, in preference to extraction, has been an undecided point among the profession, I spent a year in trying to decide the matter for myself. I cleaned up the condition with all possible care

and filled the root canal in orthodox fashion, to invariably have a fistula develop within a year. Just why enough pus should lurk in the neighborhood to result in a fistula, when after the same procedure this result is rare in an adult, it is difficult to say. And so, in preference to taking chance in the matter of leaving any pus at the root of an abscessed deciduous tooth, to thrust its handicap upon the child and the growth of the oncoming permanent tooth, I make it a rule to extract all abscessed deciduous teeth and am firmly convinced that this is the correct procedure.

As regards other reparative work in deciduous teeth, I find Black Copper Cement or Amalgam to be the best filling for cavities. A very careful check was made of this when the clinic first opened. Small cavities are best treated with Silver Nitrate. Every day I see teeth that were treated in this way over two years ago with no further decay. Whilst the appearance of Silver Nitrate is rather objectionable, it is the only treatment for anterior teeth, as filling these is most unsatisfactory.

Nerve capping has given indifferent results. When the cavities are large and there is likelihood of an exposure, I leave a layer of decay, treat it with Silver Nitrate, and fill with Cement. This, I find, is the best capping.

My final word is "treat the deciduous tooth with the respect it deserves; for without a stable foundation how can one erect a structure of stability or beauty?"

Pioneers in Anaesthetics

THAT the pioneer of anaesthesia was regarded as a quack is an almost forgotten piece of history which was recalled by Dr. J. Basil Hall in his presidential address to the British Medical Association at Bradford.

Horace Wells, a dentist of Hartford, Connecticut (said Dr. Hall), first conceived and put into practice in 1844 the principle of inducing unconsciousness during dental operations by the inhalation of nitrous oxide gas. Pronounced as an impostor, his mind became unhinged, and he committed suicide in gaol at the age of 32.

The use of ether was introduced in 1846 by Morton, Wells' partner. It was suggested to him by Charles Jackson, a chemist of Boston. Disputes as to priority arose. Morton died bankrupt and broken-hearted, and Jackson, like Wells, became insane and died in an asylum.—*Record*.



Misunderstandings

MUCH of the misery of life is caused by misunderstandings—more real unhappiness than that brought about by bereavement or unavoidable sorrow. It is so easy to misinterpret motives and to misjudge actions. Much of the time we really do not try to understand—we content ourselves with an offhand conception of things, the most convenient conception, and we nurse this hastily-formed notion as if it were the most profound conviction. Why do we not try harder to understand each other? Is it due to mental laziness, or to mental perversity? Possibly it may be due to both; but in any event it is all wrong. So much misery should never be caused by misunderstandings. The lives of some of the world's greatest characters have been saddened and scured by this means. Take, for example, the classic case of Othello and the gentle Desdemona. There never was in all literature a sweeter, more lovable character than Desdemona; there never was a stronger, more virile man than Othello, and yet these two precious lives were wrecked and made to end in a hideous tragedy solely through misunderstandings. Of course in this case—as, indeed, in almost all cases—the misunderstanding was fostered by others with ulterior, unworthy and malicious motives; but the fundamental fault lay in two things—in the age and in the individual. The age was one in which suspicion and uncertainty were rife, and Othello, with all his strength, was weak in one particular, just as other strong men have been. It seems to be the fate of many of our strong men to be easily duped in some one direction.

Take Geraint and Enid, and see the misery these two noble souls endured through misunderstanding—a misunderstanding which might easily have ended in as great a tragedy as that of Othello and Desdemona had not an accident opened the eyes of Geraint. Take the numberless cases in your own experience where misunderstandings have marred the happiness, and in some instances have ruined the

lives, of those you know. The tide of a life is often turned on a trifle—a trifle started because somebody misunderstood.

There is one fundamental obligation in life that should be binding on others without understanding their motives. Our great fault is that we do not take the trouble to seek out the mainspring which impels people to do things; we judge only by the act, and overlook the motive. In many cases in law, of course, this is necessary, but the bare processes of the law do not delve so deeply into the heart of things as does the finer essence of ethics, which, after all, should be the supreme arbiter of justice in our relationships one with another.

If people would try harder to understand each other it would at once cut the bitterness of the world in half. Most of the contentions are started by hearsay and petty babble; gossip is the great disturber of the peace. It is not so much what people do as what they say that causes trouble, and not so much what they say as what they are supposed to say. In other words, it is what someone else says they say. The meddlesome third party is the chief offender in most quarrels. If we make it a rule of life never to take offence or to lose our equanimity at a reputed word or act till we have followed it to its source and searched out its motive, we shall not only save ourselves from much annoyance, but we shall insure greater happiness for others. Let us go frankly to a man who is reported to have wronged us, and talk to him face to face, and as man to man. Often we shall find that his point of view is not the one that has been represented to us; often we shall find that we have no controversy with him at all. It is never safe to judge by appearances—let us get at the heart of things. "To know all is to forgive all," applies to most of the inharmonies of life, and if we resolutely determine that we shall never pass judgment on men till we know all the facts, we shall find that the machinery of life will be thereby oiled and the friction greatly reduced. Why does it seem so hard for us to learn this lesson? Why do we waste so much time and energy in useless contention, when if we took the trouble to understand we would not have to contend at all? Wastefulness is one of the great crimes of life, and there is no wastefulness worse than that of anger, where anger is not called for. If we took the trouble to avoid misunderstandings we would add immeasurably to the harmonies of life, and contribute greatly to our own happiness.

A handwritten signature in cursive script, reading "C. H. Johnson". The signature is written in dark ink and is positioned in the lower right quadrant of the page, below the main body of text.

Character is higher than intellect. A great soul will be strong to live as well as strong to think.—*Emerson*.



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ALBERTA.

THE special party of dentists going through to the Canadian Dental Association meeting at Vancouver stopped off at Edmonton for a few hours, and were entertained by members of the Edmonton Dental Society. The visitors were shown the Parliament Buildings, the University and other points of interest, and then sat down to a pleasant luncheon before their train carried them away from what Calgarians are apt to consider the finest city but one in Alberta.

The same party, somewhat depleted in numbers, spent a Sunday in Calgary on their way home. They were met by members of the Calgary Dental Society, who greatly enjoyed the visit of their confreres (and wives) to the city.

Since then various members of the party have straggled through towards home. These last (mostly from Ontario) do not explain their delay, but praise highly the climate and hospitality and laws of the Province of British Columbia.

* * * *

Mention should be made in ORAL HEALTH of the splendid athletic record of Dr. M. M. Dunsworth, of Edmonton. Dr. Dunsworth has long been known as a basketball star in a city where basketball has reached a high state of perfection.

His tennis record, however, deserves special notice, as a glance at his performances in 1924 will show. During the year he has won four open championships and cups as follows:

Open singles.—Championship, with cup, Patricia Square Tennis Club, Edmonton.

Open singles.—Championship, with cup, city of Edmonton.

Open singles.—Championship, with cup, Province of Alberta.

Open singles.—Championship, with cup, Western Canada, at Saskatoon.

Such a list of wins, together with victories in men's open doubles

and mixed open doubles, shows a high quality of play, and an extremely consistent performance which is remarkable. Here's hoping he may look further east next year with equal success.

J. W. C.

* * * *

EASTERN ONTARIO DENTISTS ELECT ASSOCIATION OFFICERS.

AT the Annual Meeting of the Eastern Ontario Dental Association, held in Smith's Falls on the 29th and 30th of September, the following officers were elected for the ensuing year:

President, Dr. H. Winters, Ottawa; Vice-President, Dr. E. H. Wickware, Smith's Falls; Secretary-Treasurer, Dr. McCaughey, Ottawa; Program Committee, Drs. W. H. Woodrow, Brockville; O. K. Gibson, Ottawa; A. W. Windott, Kingston.

The next Annual Convention, 1925, will be held in Cornwall.

W. G. T.

Report of Chief Medical Officer to the Ministry of Health

AMONG the things that are required at the present time, Sir George Newman urges the power of the Press to make known to the public its own great needs, and the remedies available; and he dwells on the great dangers inherent in "minor diseases." "Attention is so easily arrested," he says, "by the ravages of the great diseases, like smallpox, influenza, cancer, tuberculosis, or venereal, that we are liable to forget that the greatest burden of our invalidity, and the chief contribution to premature mortality are due to the neglect of the comparatively minor or incipient forms of sickness and ill-health. Moreover, they are not only causes of incapacity, but they lay the foundations of the major diseases. . . . It is not easy to overestimate the harvest of sickness and death attributable to the neglect of such maladies as dental caries, oral sepsis, habitual constipation, neglected colds, dyspepsia, measles, or discharging ears. We seem to shut the main gates of the city against a common enemy, but leave open a dozen doors by which he may enter in." Members of the dental profession, as guardians of one of these doors—and that not the least important—we may permit ourselves to feel a pride in the fact that in our daily work we are playing the part of sentries. How can we best keep the enemy out? Do we use our very best endeavor to do so? Do we sometimes forget the great responsibilities imposed upon us; or is the sense of them dulled by less worthy considerations?

ORAL HEALTH

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EDITORIAL

Professional Ethics Based on the Fundamentals of Character

IN these modern days of stress and strain too many members, both of the medical and dental professions, are inclined to look with little seriousness on the matter of professional ethics. This weakness, no doubt, is largely due to a lack of proper appreciation and understanding of the great fundamentals of character upon which the code of professional ethics is based.

We professional men are too apt to treat our ethical codes as merely a set of rules, externally and superficially applied for the guidance and discipline of members.

Professional ethics we may characterize as one form or phase of applied ethics, which is, in its turn, the working out in life and practice of the fundamental principles laid down or formulated by scientific or pure ethics.

It is the province of pure ethics as a science to discover the ultimate good in human life, to reveal the great and universal aim for which the individual may and should strive. This, in turn, constitutes the standard by which all human acts or activities should be judged as good or bad, right or wrong.

Applied ethics attempts to apply this standard of moral judg-

ment to the specific activities as we find them in the family, the state, and other social and economic relations.

Professional ethics, as one phase of applied ethics, merely attempts to relate these standards and principles to the special circumstances and obligations of professional life, and to determine how these may differ from the duties and obligations resting upon men in other walks of life.

This fact should prove a restraining influence upon those who would attempt to excuse professional misconduct, of whatever nature, on the ground of financial necessity or personal convenience.

The truly ethical practitioner is a man of character, and therefore the secret of ethical conduct is to be found only in the deep-seated principles that go to make up character and personality. As members of the great healing profession we would be well advised to read again the Hypocratic oath, of immortal fame, and re-learn the age-long lesson that "the spirit ruleth rather than the letter."

The professional man is judged, not so much by what he is, as what he does. Conduct is but a revelation of character.

R. G. McL.

Editorial Note

DR. C. E. PEARSON is moving his office to the Physicians' and Surgeons' Building, Toronto, early in December, and his present suite of five rooms, suitable for two practitioners, in the Royal Bank Building, Bloor and Yonge Sts., will be available for transfer of lease at that time. Dr. Pearson will be glad to hear from anyone who may be interested.

Juvenile Jingle

Our Pores

I have little holes all over my skin,
My mother calls them pores,
She says that I must always watch
That nothing shuts those doors.
They're just to let the pure air in,
But bits of dust will fly
Right in those holes, and if they stayed,
In time, why, I would die.
So that is why I wash and wash,
For closed pores cannot stay
If boys and girls use lots of soap,
And wash well every day.

—Dora L. Cameron.

ORAL HEALTH

A JOURNAL THAT STANDS FOR THE "OUNCE OF PREVENTION," AS WELL AS THE "POUND OF CURE"

Vol. 14

TORONTO, NOVEMBER, 1924

No. 11

Symposium*

The Pathology of Gingivitis and Periodontitis

JOSEPH S. GRAHAM, M.B., M.R.C.S., *Royal College of Dental Surgeons.*

THERE has always been a wide divergence of opinion as to the pathology and causative factors in the disease spoken of by some as Pyorrhea and by others as Periodontitis.

In the University of Brussels there are in the Library a collection of no less than 550 studies on this subject, and in the Library of the University of Pennsylvania some five hundred books and articles.

Two schools of thought have gradually been evolved. The earlier feeling was that the disease process always commenced from without. Riggs felt that this was the case and based his views on his ability to control the disease to a certain extent by external work, such as scaling and cleanliness.

Miller thought the condition commenced as an infective process, starting as a gingivitis and later invading the structures. Roemer and Langraf, both pathologists, felt the same: that first there was a gingivitis and later bone atrophy.

Black thinks that there is primarily a gingivitis and that the infective process follows, but differs in that he thinks the loss of bone is due to infection together with stripping of the pericemental fibres, but that the major cause of absorption of alveolar bone is due to detachment of the pericementum from the cementum. This point will be taken up later.

A second group of men think that there are two distinct types of periodontitis with quite different aetiological factors. The one has been spoken of as Periodontitis Simplex, or horizontal pyorrhea—a slow progressive gingivitis with shallow pockets and but little divergence from normal mobility in the early stages. General or local dis-

* Symposium of three papers read before the Ontario Dental Association, May, 1924, and based upon Bulletin No. 7, Canadian Dental Research Foundation, by Dr. Harold Keith Box.

orders of the gingiva occur, causing relaxation of fibres extending into the papillae with the subsequent formation of a subgingival space. There is a gradual deepening of the subgingival space with extension downwards of epithelium. Infection now enters the gingiva and gradually extends downward causing stripping of the upper pericemental fibres and a shallow pocket is the result. The crest of the alveolar bone is always absorbed in advance of the shallow descending pus pocket. In this type there is no extensive absorption of the alveolar process nor of inflammatory reaction in the pericementum. This simplex type comprises 20% or less of all cases.

The other type which has been spoken of as Periodontitis Complex or Vertical Pyorrhea is quite different from an ætiological standpoint in that the disease process starts from within. John Hunter in 1771 noted that the first occurrence in this disease was a wasting away of the alveolar process. Prinz states that the absolute constant initial lesion is a marginal alveolar atrophy.

Holding this view at the present time are Talbot, Hopewell-Smith, Fleischman and Gottlieb. Prinz goes on to say in his excellent article that this view is also held by Box and that in general, in the very early stages, the pericementum is free from inflammation and stresses the absence of pain as a profound negative symptom as a proof of this view. Box holds that while the rarefaction of the alveolar process is an early spectacular phase of this disease and always precedes the gingival lesion in this group, yet the essential primary lesion is in the pericementum. To this initial lesion of a true periodontitis he has given the term pericementitis fibrosa. By periodontitis we mean an inflammatory condition affecting not only the pericementum, but also the supporting bone and the gingiva.

The disease process commences with cell proliferation in the immediate neighborhood of the minute blood-vessels in the pericementum. The cells predominating in the first instance are the endothelial type, but there is also a marked proliferation of an early type of fibroblast cell. Proportionately they are very rare—an indication that the early stages are not due to a reaction on the part of the tissue to an injury complicated either by poison or infection. As this new tissue, one might speak of it I think as a metamorphosis, approaches in its growth the alveolar process, changes are effected fairly rapidly and the result is a rarefying condition due to increased activity of bone breaking cells. Whether these bone breaking cells are the multinuclear osteoclast type or apparently from the pictures an osteoblast cell, is to my mind an academic question. We find some resorption of bone where the stem of a pipe is fairly constantly held between the same teeth, in certain cases of malignant new growth for example, so that apart from our pathological findings there is no reason to suppose that infection is an essential factor in the commence-

ment of this disease. As a result of the invasion of bone by this new tissue, the bony tissues diminish in size and the marrow spaces are in proportion increased. The marrow spaces are thus occupied by the same type of tissue above described as first affecting the pericementum in the complex form of periodontitis.

Changes now occur in this newly formed tissue. There is noted a marked decrease in the endothelial cell and a corresponding increase in the number of fibroblast cells, the result being the formation of a low grade connective tissue. Contraction of the cell processes causes, as is usual in newly formed connective tissue, a further diminution of blood supply. As a consequence of this diminution of nutrition there is a marked relaxation of the crest group of fibres of the alveolar process as well as those principal fibres extending from the cementum to the alveolar process and from the cementum to the long fingerlike papillae of the Gingiva. With the consequent formation of a sub-gingival space and the subsequent entry of infection, we have formed the long and extensive pus pocket. The rapidity of this process is due probably to the low grade tissue together with a diminished blood supply encountered by the invading organisms. As to the causative factors underlying the disease, there naturally must be a good deal of speculation. Dr. Box, with the restraint of a born investigator, is content to leave it there until he absolutely knows the truth, but with some of the dogmatism of a teacher I will give you what I feel to be a good working theory.

Any local or general state which brings about a condition of passive hyperaemia or venous congestion, in which less blood than normal enters the area and from which there is a corresponding lessened return, is accountable for the commencement of the disease.

In an area so affected the vessels are dilated, crowded with blood cells, the movement of the blood is slower, changes in the permeability of these small capillaries have occurred and there is an increase of fluid in the tissues. On account of the fact that the pericementum is extremely thin and by reason of the fact that there is no possibility of swelling due to the presence on the one side of tooth and on the other of bone, we have a local condition which rapidly becomes one of venous congestion.

Proliferation of the endothelial and fibroblast cell is not due to diminished nutrition only, but is due probably also to the fact that we have a diminished oxygen supply together with the presence of by-products of metabolism.

It will be an interesting study to determine the frequency of periodontitis of the complex type in chronic heart disease. I find that in the practice of internal medicine, when an obscure condition presents itself for diagnosis, it always is good practice to consider the probable conditions and not to speculate too much on the rarer possibilities.

I feel that the commonest factor in the production of this disease is local repeated simple injury, which brings about the above noted nutritional changes—in other words Traumatic Occlusion.

Dr. Graham then showed some slides illustrating the progress of the disease and some of the research work conducted thereon.

* * * *

The Mechanics of Occlusion*

G. R. ANDERSON, M.A., *Royal College of Dental Surgeons.*

Mr. Chairman, Ladies and Gentlemen: I think I may be pardoned a certain amount of diffidence in attempting to address a dental audience on a subject of this kind. What I have to say is practically some explanation of what is contained in the bulletin which everyone has. The only information that I found available on the question of the Mechanics of Occlusion was a paper presented by Dr. Gysi about 1920, I think, in New York, in which some discussion was made in regard to the Mechanics of Occlusion. The conclusions he arrived at can be found in his original paper. I have looked at it from a somewhat different view, and I simply make what explanation I may make in the matter.

The first point noticed is the question of the Mechanics of the Mandible as a whole. It is often stated that the Mandible is a lever of the third order. A lever of the third order is one where the work is done at a mechanical disadvantage, and on that ground the design of the mandible is criticized as being faulty.

Now in the first place a lever, as we ordinarily understand it, like a crowbar or anything of that kind, is plain mechanism, that is to say it is a bar used for raising something, prying up one way or the other, and therefore the forces in it are all in a line. Now the Mandible is not a straight line object and the Mandible consequently cannot by any stretch of the term be called a lever. It is an extended structure, and the forces brought into play in an ordinary action of the mandible are at least five. In a lever there are only three,—as we ordinarily understand it, it is a bar of some kind which rests on one end and is raised on the other. In the case of the Mandible there are at least five actions brought into play. As I have placed that in the mouth there are six. The attachment of the two muscles in the side which pulls the mandible up, the reaction against the condyles and the pressure on the teeth. Finally there is the force between the teeth and pressure exerted on one or both sides. If you take it straight across, there are six. There are at least five forces concerned in that. The solution of that is an ordinary problem in Mechanics, and we can find from that, as I have shown in the bulletin, of the crushing here of some object on the tooth placed on this side. We can show that if the

* Complete paper published in Bulletin No. 7, Canadian Dental Research Foundation.

object is placed back here, about at the second molar, that the jaw will work with an efficiency of some 55%. Now that is not an inefficient mechanism. The pushing of the object is not the only function that the jaw has to perform, so that must be kept in mind.

Prof. Anderson then showed his slides.*

He thereupon further addressed the delegation as follows: Another tooth is here in position and is subject to the following forces: there is the stress brought upon it by the opposing tooth; there is the resistance of the socket and the pericemental membrane and the alveolar process; that is to say, the tooth is held in position by reactions on the side above and from below up. If any one of these is reduced or disappears entirely, then motion is bound to result in the direction of reduced resistance. In other words, if a tooth is taken out from one side that normal pressure is reduced—lateral drifting. If the opposing tooth is taken away the tooth rises—elongation.

Now these are the mechanical points that I think you will find incorporated in that paper. I have given this by way of explanation in detail of what is all set forth in the bulletin.

* * * *

The Prevention of Chronic Periodontitis

C. E. SUTTON, D.D.S., *Toronto.*

THE object of this paper is an endeavor to stimulate the interest of the General Dental Practitioner in those diseases of the Periodontal tissues termed by Dr. Harold Keith Box, Chronic Periodontitis.

This phase of Dentistry has not in the past received the attention its importance merited.

The scope of Operative Dentistry in most offices today is limited to the repair of damage inflicted by caries, to treatment of diseases resulting from exposure or death of the pulp, extraction, and little intelligent attempt at treatment of Chronic Periodontitis.

With the advent of the focal infection theory, and frequent conviction of the teeth and associated tissues, as the causative factors in systemic disease, the dentist has had thrust upon him a very vital responsibility. He has become a factor to be reckoned with in the maintenance of general health, and for this reason he must be qualified to be of the same assistance to the medical diagnostician as any other medical specialist.

To maintain this position, he must prepare himself to meet the new responsibilities that are entailed. Indeed it is unthinkable that we shall neglect such a service to humanity and fail to keep step with the new demands upon our resources.

We have been censured for our excessive interest in the mechanical phase of dental practice; and the apathy which we exhibit toward

* Bulletin No. 7, Canadian Dental Research Foundation.

Periodontal Disease; and if we are honest with ourselves, we must acknowledge that these strictures are not far from the truth.

The status of the pulpless tooth is not settled, and if there should be produced irrefutable evidence that a pulpless tooth is a menace to general health, the field of Dentistry would be a narrow one indeed.

However, there is left the almost unexplored region of the periodontal tissues. It is estimated that the great majority of people past middle age, and a high percentage under that period, are affected with some form of Periodontal disease, to a greater or lesser degree.

It is undoubtedly true that as many teeth are lost from these diseases, as from all other causes, and there is no doubt that parietal disease is quite as great a menace as periapical lesion to the general health.

The opportunity for service in this field is so great, that it is amazing, we have so long neglected it. It is not easy to place the blame for this neglect, but the basic reason would seem to be lack of understanding of the pathology and etiology of these periodontal diseases.

There is no doubt that extreme pessimism exists regarding prevention of treatment of Chronic Periodontitis, and we can scarcely wonder, when we see so much empiricism displayed in our literature on the subject. Drugs, electricity, vaccines, all have their advocates.

Certain men claim that success can only be expected through an operation which requires the excision of the gingival tissues, and in many cases the alveolar bone as well; a treatment which could only be undertaken by the most ruthless practitioner.

However, with the discovery of the basic lesion, Rarefying Pericementitis Fibrosa and its relationship to Infective Periodontitis, and the proven hypothesis that Chronic Periodontitis belongs in the category of curable diseases, a new era has been ushered in.

Prevention is defined as the warding off of disease. It is the ideal towards which we all are striving in both Medicine and Dentistry.

Preventive Medicine has made such wonderful strides in recent times, that we are fortunate to be living in this enlightened age, instead of in the past, when our physicians were helpless in the presence of so many diseases, now conquered. There remains much to be done, and eminent authorities predict that the next great forward step should be made by research, in oral disease.

Upon the General Dental Practitioner lies the responsibility of preventing Chronic Periodontitis. He is consulted by the patient as a rule, for other forms of service, unsuspecting the presence of incipient lesions, which may lead to loss of teeth, destruction of the associated tissues, and establishment of foci of infection.

As an outstanding pre-requisite, the practitioner must have the ability to make a diagnosis. To make a diagnosis implies a knowledge of the nature of the lesions comprising this composite disease, and

the regions in which these disease processes become initiated, as well as the known causative factors involved.

But as a background he must be familiar with the tissues, in a normal healthy condition, and in normal function.

It will be recalled that the term "Periodontium" is used, to designate the supporting tissues of the teeth. Its three main tissue components are, the Gingivae, the Pericementum, and the Alveolar bone.

By the term "Periodontitis" is denoted an inflammation of the periodontium, and a disease so designated involves *all three tissue components*.

Based on clinical and pathological findings, chronic inflammations of the Periodontium may be classified as follows:—

(1) Chronic Periodontitis (Simplex).

(2) Chronic Periodontitis (Complex).

In both types of Chronic Periodontitis, infection has gained entrance into the Cemental Gingiva, and produced a pocket progressing into the deeper tissues.

Normal Gingivae are highly vascularized, resistant, tissues.

Some agency must lower their resistance, in order that the ever present bacteria may gain entrance into these tissues, and it will be recalled that the weak link in the chain of protection, from infection, is the thinness, and breaks in the continuity of the epithelium, on the crevicular surface of the marginal gingivae.

There is a long list of irritants, which can produce a gingivitis,—such as plaques, rough enamel, etched enamel, rough edges of fillings, food debris, food impaction, etc.

By progression of the infective inflammatory process, a pocket is formed in the Cemental Gingiva. By extension of this pocket, bone absorption takes place, and the Pericementum is infected.

In this order is produced the type of Chronic Periodontitis called "Simplex." This type is comparatively rare, with shallow pockets, of fairly even depth, encircling the tooth; and for these reasons called by some, a horizontal type.

The Complex type is produced in an entirely different manner. It consists of the infective periodontitis just described, which has been super-imposed upon an already established Rarefying Pericementitis Fibrosa. This latter is a chronic and progressing lesion of the Pericementum, which results in the rarefaction and destruction of the alveolar bone.

It is to be emphasized that this disease which affects the pericementum and bone is not an infective process.

There are two points of the greatest importance to be borne in mind concerning this basic lesion, Pericementitis Fibrosa.

1st. That the lesion is a casual one, in that it provides the requirements for the establishment of infection, in the gingivae, and its progression into the deeper tissues.

2nd. That the lesions manifest themselves in the periodontal tissues of teeth in over-function, or traumatic occlusion, and appear to originate in the pericemental tissues which are subjected to abnormal occlusal stress.

In other words, traumatic occlusion seems to serve as the important factor, in the localization of the disease process.

Conversely,—it would seem, therefore, that the important factor in the protection against localization of this disease process is the existence of either normal or acquired physiological occlusion.

It will be recalled that the subject of this paper is the Prevention of Infective Periodontitis.

The preventive measures to be instituted may be divided into five main groups:—

- (1) Early diagnosis of Rarefying Pericementitis Fibrosa.
- (2) Early diagnosis of Chronic Gingivitis (pocket in the Cemental Gingivae).
- (3) Establishment of physiological occlusion, because of its beneficial effect upon the Fibrosa, and thus upon the Gingival tissues.
- (4) Establishment of adequate oral hygiene measures.
- (5) The production of increased local immunity, through vaccine therapy.

DIAGNOSIS OF RAREFYING PERICEMENTITIS FIBROSA.

While the formation of peri-vascular nodules is the essential element in the early stages of Pericementitis Fibrosa, the spectacular phase is the rarefaction and destruction of the alveolar bone.

While in certain cases through very slight divergence from the normal mobility of the tooth in its alveolus, the primary pericemental lesion may be detected; yet, in the majority of cases the disease is first manifested through structural changes in the alveolar bone.

These are apparent radiographically under certain conditions, in the crests of the septal bone and in the lamina dura of the wall of the alveolus.

Any disturbance of the normal relationship of the alveolar crest to the amelo-cemental junction or of the normal relationship of the lamina dura to the pericementum must be viewed with suspicion.

Recession of the gingival margin toward the amelocemental line is usually indicative of alveolar crest resorption. This may be manifested in the mouth as symmetric or asymmetric recession.

In certain cases the process of rarefaction is characterized by a fairly uniform resorption of the alveolar wall with consequent thickening of the soft tissue content lying between the tooth and the bone.

In these cases there is likely to be found a marked divergence from normal mobility.

It is to be stressed that the gingivae are normal with no increase in the normal depth of the gingival crevice.

EARLY DIAGNOSIS OF CHRONIC GINGIVITIS.

(Pocket in the cemental gingiva)

The significant feature of the establishment of infection in the gingival tissues is the fact that in the majority of cases, it begins as a sub-acute process, a reaction to mildly-injurious agents.

Through this process the epithelium proliferates along the tooth, and with separation a pocket is formed. Because of its mild inflammatory nature in many cases the probe has to be resorted to for the detection of any increase from normal in the depth of the gingival crevice. It can be assumed in the average case that when the probe penetrates farther than the 2 mm. mark, but not farther than the 4 mm. mark, we are dealing with a pocket in the Cemental Gingivae; and this is indicative of chronic gingivitis.

ESTABLISHMENT OF PHYSIOLOGICAL OCCLUSION.

Any tooth under occlusal stress and acted upon by forces in equilibrium presents to us the ideal picture of physiological occlusion. That is a condition in which the force of resistance offered by the alveolar process is equalled by the occlusal stress directed through the tooth. When the system or systems of forces acting upon the tooth are not in equilibrium, the tooth can be said to be in traumatic occlusion.

In Physiological occlusion there is present as a rule an admirable co-ordination of jaw with jaw and tooth with tooth; but of first importance is the harmonious relation existing between the tooth and its periodontium.

The procedure of transforming so-called traumatic occlusion into physiological occlusion is termed equilibration. As physiological occlusion appears to exert a protective influence against the establishment of the basic lesion of Chronic Periodontitis, its establishment by the operator is a fundamental requisite as a preventive measure.

ESTABLISHMENT OF ADEQUATE ORAL HYGIENE.

This subject will be dealt with from two viewpoints:

(A) Sanitation.

(B) Stimulation.

The responsibility is placed upon the operator, of establishing such conditions in the mouth, that the patient with reasonable care can maintain a state of cleanliness. The removal of salivary and serumal concretions, ragged edges of fillings, crowns, etc., and restoration of proper contacts in this relation, is thoroughly understood, and needs no further comment.

It is a striking feature that clean teeth are usually associated with

healthy gingival tissues. In other words, great difficulty is experienced by the patient, in keeping the enamel surfaces clean in the presence of marked infection of the gingivae.

The average patient through faulty instruction, or through lack of any instruction in the care of the mouth, has acquired an improper system of oral hygiene. It rests with the dentist to instruct the patient in such a system as will adequately keep the teeth clean, and through stimulation to the gingival circulation, maintain in the soft tissues a state of high tone. It is doubtful if any known system meets these requirements quite as well as that advocated by Charters and modified somewhat by Bricker, Stillman and others. Briefly this method entails the placing of the bristles of the tooth-brush in certain positions, so that all surfaces can be subjected to a vigorous vibratory action of the bristles. Their direction is such that the bristles penetrate to a slight extent into the gingival crevices, and under pressure the gingival tissues become blanched, owing to pressure upon the blood-vessels. Relaxation of pressure is followed by a rush of new blood into the tissues. A prolonged and gentle stimulation of this kind leaves the tissues in a state of warmth or glow, not unlike the reaction in the skin to massage. The brush is dipped in a mild salt solution. It is important to emphasize the fact that while the bristles *dislodge* foreign material, they do not *remove* it from the mouth; this is accomplished by repeated rinsing with clear water.

A useful adjunct in certain cases where tissue tone is low, has been found in the use of the vibrator attached to the dental hand-piece.

In certain mouths there is noted an evident susceptibility of the whole mouth to infection. In these cases beneficial results have been noted following the administration of a new polyvalent vaccine perfected by Goldenberg of Paris. It has for its object the production of anti-bodies in the mucous membrane.

DISCUSSION.

DR. A. J. McDONAGH: I am going to do what I rarely do on an occasion of this kind—make an apology. I see that you gentlemen expect me to say something that will be of interest to you. I have not seen the bulletin that you have. I could not get a copy of it, and I have not really had time to study it and express myself upon it, but I will tell you all I can in the short time I have.

In the first place, I want to say that I have the greatest admiration and appreciation of Dr. Harold Box. Dr. Harold Box has done work that no other Canadian has done. He has gone into the field of Histology and he has done more in that field than any other ten men have done in Canada. He has kept to his work night and day and he has produced a great many things. Many things that he has produced have not just been what he thought they were, but every

investigator has that experience. I believe I have objected to some of the findings that he has expressed in some of his slides, but that goes with every investigator. At the present time it has been said that we were disappointed because we have not received anything new. (This apropos of the remarks from someone in the audience during the discussion) Gentlemen, we have received something interesting—this description of the alveolus is a new description. I do not believe it is a new disease, but it is a new description of a condition in the mouth. Perhaps there are similar conditions which have been described in other parts of the body, but they have not been described as taking place in the mouth, and Dr. Box has described the destruction of the alveolus in that particular place.

Now I am not quarrelling with what Dr. Graham has said, today, but some of the reports I do take exception to. I say conclusively that traumatic occlusion is not a primary aetiological factor in dental periclasia. It is not and never can be. What causes Traumatic Occlusion? Take the North American Indian and the Eskimo, all those people who lead a natural life, they have no Traumatic Occlusion. They have perfect periodontia. Then you must go back and get some cause for your Traumatic Occlusion. We have studied symptoms. We have to go back of that if we are ever going to get anywhere and we are going to get there by education, by educating the mothers and by educating those who are taking care of children.

Down in the Forsythe Institute, when I was down there some time ago, Dr. Percy Howe showed me cases of dental periclasia in animals caused by feeding. Dr. Hess says—and he proves by his experiments — that as a result of rachitic diet and the lack of sunshine that the blood vessels in the pericementum break down. Dr. Eugene Talbot years ago came out with the flat assertion that the cause of gingivitis was constitutional. Now Dr. Graham comes to us today and says these are nutritional changes. Why is it a nutritional disturbance—because of traumatic occlusion, or is it from a systemic cause? Now if we want something new we must find out what it is. We know the cause of Dental Periclasia; we know we can cause it by feeding. Every practitioner knows that. You know there are hundreds of cases every spring, which clear up, because of feeding throughout the winter.

We know that those things happen, and now Dr. Box comes along and he shows us slides showing a condition in the pericementum and a condition in the bone, and I am glad to see, according to Dr. Graham, he does not say: "This is the result of——." He says: "Here are the slides, draw your own conclusions." As far as I can see Dr. Graham and Dr. Box do not draw the conclusions; it is the newspaper men that draw conclusions.

Now we come to Traumatic Occlusion. I was talking it for a great many years. I was greatly stimulated in the study of it by Dr.

Stillman. He is an enthusiast. All of his theories are good, and that sort of man who makes a hobby of a study for a short time does more good to our profession than the man who goes along and says: "Well, I guess it is all right." Well, I was stimulated by Dr. Stillman, and I acknowledge that I was; but found that my results were not the same as his in grinding the teeth. So I said I would go a little further, and as you will find from a reprint of a lecture I gave down in Atlanta a couple of years ago, the gist of the whole thing is this: that Traumatic Occlusion, as we talk of it every day, is nonsense. You do not get injury from Traumatic Occlusion when the impact is lightened by the long axis of the tooth. The injury you get is from leverage when the line of impact is not in the natural line, not in the line of long axis of the teeth. I have seen teeth ruined by over-grinding; grinding just for the fun of grinding is a crime. They are not doing that now over on the other side. The best men over there, what are they doing? Instead of grinding of the teeth they are building them up, building them back to normal, paying attention to the age and occupation. I tell you, gentlemen, and you all know it as well as I do: before we knew anything about this extreme teaching of Traumatic Occlusion we treated what we call Pyorrhea. I have cases coming into my office that I treated and you gentlemen treated ten, twenty years ago, perfectly healthy teeth. Why? Because you at that time gave good instructions and corrected conditions. Don't get the idea that I am decrying grinding the teeth when it should be done; but it is only done when you get an unnatural leverage.

Now as regards the bone breaking down around the blood vessels: about ten years ago Dr. Arthur Black came here, and he told us that Dr. Noyes had showed conclusively that the perivascular lymphatics in the pericementum carried infection from the gingival crevice to the pericementum and that somewhere in the perivascular lymphatics there was stasis, and you had the destruction of the alveolus. Dr. Noyes says he had found micro-organisms in those positions, and at times he had found no infection. Now Dr. Box comes along and says *there is no* infection around the blood vessels. Just one step further along the work. It is quite true that perhaps the specimens which Dr. Box has had had no infection. That is an academic question, and it is not decided today. I do not pretend to be able to criticize the work of a pathologist such as Noyes or Hopewell-Smith or Box. I have enough sense to pick out what is good in their work, I hope, but the fact that we have different opinions of different men makes me exceedingly sorry that this bulletin which we have issued today had not the benefit of the constructive criticism of a man like Noyes or Hopewell-Smith.

There is just one more point I am going to make and then I am going to sit down. In my discussion at Atlanta I made one point down there. I said the veins in the pericementum have no elastic

coat, and they have no elasticity. On account of the action of the heart, the arteries have. They have the force of the heart behind them. When you make an unnatural impact on your tooth, not in the line of the long axis of the root, you are apt to injure that thing because of the stasis in the return blood, and at that point you will have a breaking down of your bony tissue. Now as far as rectifying that condition, rectify your occlusion. As far as pyorrhea being a curable disease, it certainly is. It is no more curable today than it was twenty or thirty years ago, but it always was curable.

Dr. Craig of Peterboro, then spoke for a moment, paying great tribute to Dr. Box's work, claiming it was epoch making in the Dental profession.

Dr. Husband: I would like to draw attention to one or two things. The question of traumatic occlusion has been raised, and my feelings are very much in line with what has been said. If you consider the ordinary things that you notice in practice which bring about traumatic occlusion and the periclasia resulting from it,—for instance, if we leave a filling too high, we know that we have created a condition of traumatic occlusion at least as between that tooth and its opposing tooth or teeth. But in the vast majority of cases do not these teeth adjust themselves to a new position caused by the slight pressure and become comfortable?

In the same way if we put on a crown that is too high, we create traumatic occlusion and cause temporary periclasia.

I have examined hundreds of cases amongst the students, and if you would stand by the chair and see the various mouths you would open your eyes. You would see cases where there are hardly two teeth in normal occlusion in the mouth. You would see few cases of normal occlusion and yet no evidence whatever of periclasia! On the other hand, in cases of beautiful occlusions,—periclasia! What is the reason for it? Nutritional changes, probably. In the case of one of the students, I do not think he had more than four teeth in contact, not to say in normal occlusion, and he had as beautiful, healthy gums as you could imagine. I do not think that a tooth was in occlusion anterior to the second molar, and there was as beautiful a condition of health in the mouth as you could wish to see. We all were discussing some of the causative factors from a historical standpoint, and I said to him: "What is the reason for your condition of mouth health?" He gave as his reason the opinion on his case of a periclasia expert, viz.: "the exceptionally high resisting qualities in his system." What is resistance or the lack of resistance? You take an old patient whose teeth have worn down—he has grown old gracefully and he has not periclasia. What is behind it? It often puts me in mind of a picture of a wilful school boy going to school for the first time. He gets in wrong with his classmates because of his little

idiosyncracies, but if he is a good healthy type he will soon be put right in a normal college; if an unhealthy type, he will always be suffering irritation and even worse things.

Now what constitutes the state of a healthy mouth, that is to say, where the nutrition is good? What is polluting this blood current? What is creating this auto-intoxication? You have been told there is no infection. What is causing this change of the tissues? Where is the poisoning coming from? I would be too long if I started to tell you where I think it comes from. When the demands of the body and the supply put into it are off tangent, or out of harmony, you can look for this trouble. Just keep a few histories, and you will find that the food supply is not in harmony with the patient's needs,—that in all probability inactivity or sluggishness is manifest.

CLOSING DISCUSSION.

Dr. Sutton—Mr. Chairman and Gentlemen:—Dr. McDonagh has this afternoon made some very positive statements. I have no hesitation in saying that, based upon what Dr. McDonagh has stated to-day, and upon what he has written and stated elsewhere, his conception of Traumatic Occlusion is distinctly at variance with that held by the leading periodontists and investigators of to-day.

In the first place, he states positively "that traumatic occlusion is not and never could be a primary etiological factor in dental periodontitis." He adds, "What causes traumatic occlusion?" As traumatic occlusion is recognized by all leading authorities to mean an abnormal distribution of stress exerted on teeth during their use, it has been defined as an "occlusal stress in excess of the normal which produces, or tends to produce, an injury to the periodontium."

Let me cite briefly some of the commonest factors in the production of this abnormal distribution of stress which are met with at every turn in dental practice.

To begin with, it is commonly recognized that inlays, fillings and crowns frequently make possible the production of occlusal stresses in excess of the normal. They therefore are factors in the production of traumatic occlusion.

Partial denture attachments are also well known factors in abnormal distribution of stress upon the periodontal tissues through abutment teeth.

Caries, when it destroys the equilibrium that exists between opposing teeth through their incline planes, is a striking cause of traumatic occlusion.

One of the greatest causes of traumatic occlusion is the inharmonious or uneven wear of occlusal surfaces.

Extraction is a conspicuous cause of traumatic occlusion. When, for example, the molars and bicuspid have been removed, and the patient uses the anteriors for mastication, a definite overload is placed

upon teeth which were not intended for such work. This overload simply means abnormal stresses, and therefore, traumatic occlusion.

The use of cigarette holders and pipes may be cited as another factor in disturbing the innocuous distribution of stress on teeth during their use, and thereby produces traumatic occlusion.

Now, I have just enumerated a number of distinct factors that frequently produce traumatic occlusion, and in each instance this factor is an acquired local condition, and therefore a primary one. No great research ability is required to seek back and determine these causes of traumatic occlusion. They are well known and recognized by all of us.

Traumatic occlusion is credited by all leading authorities with being one of the most important and commonest etiological factors in the production of periodontal disease. One need go no farther than the writing of Best, Box, Bricker, Grieves, Hutchinson, Hinman, Merritt, McCall, Stillman, Tishler and Towner to substantiate this statement.

I feel, therefore, that Dr. McDonagh is not justified in making the positive statement that, "traumatic occlusion is not and never could be a primary etiological factor in dental periclasia." In fact, I have no hesitation in going on record as stating that I believe Dr. McDonagh is absolutely wrong in his contention.

It would seem that at times Dr. McDonagh confuses so-called malocclusion with traumatic occlusion. This mistake is one which is frequently made. It cannot be emphasized too strongly that these are quite different conditions. Either may exist without the other. Malocclusion as commonly understood means irregularity or malposition of the teeth, and is an anatomical derangement, but traumatic occlusion, on the other hand, is a functional disturbance which is admittedly often induced by a pre-existing malocclusion. Furthermore, traumatic occlusion is frequently present in the condition of so-called normal occlusion, and is often difficult to detect. In fact if traumatic occlusion could be as easily detected, in all cases, as malocclusion, its importance would have been appreciated long before this.

Dr. McDonagh has stated this afternoon that traumatic occlusion as we talk of it every day is "nonsense." He refers us to a paper read by him at Atlanta, and entitled "Traumatic Torque." He says that the "injury you get is from leverage when the line of impact is not in the natural line, not in the line of the long axis of the tooth." It is inconceivable to me that Dr. McDonagh could have been unaware of the fact that the question of "torque" and its relationship to traumatic occlusion and periodontal disease has been so thoroughly covered by Dr. Box and taught by him to the students of the Royal College of Dental Surgeons as far back as 1919. To confirm this, I would refer you to the notes compiled from Dr. Box's lectures by

Dr. H. A. Ross of this city. In 1920, in the Thesis submitted by Dr. Box for his degree of Doctor of Philosophy, the subject of "Torque" as part of traumatic occlusion was gone into still more minutely. I have distinct recollection that this subject was discussed by Dr. Box at the Ontario Dental Society meeting of 1920, and also at Columbia University in the same year. A knowledge of the question of "Torque" in occlusion is a recognized fundamental requirement in the successful treatment of periodontal disease.

Again Dr. McDonagh has to-day made another very positive statement, and one which I believe is open to question. He states that the North American Indians and Esquimaux have perfect periodontia. This is indeed a sweeping statement and one that invites inspection. It can be answered by stating that a careful examination of skulls of Esquimaux in the Redpath Museum of McGill University and of North American Indians in the Victoria Museum at Ottawa will reveal an abundance of evidence which will contradict his assertion. There are to be seen in these skulls numerous examples of destruction of alveolar bone. I fail to see how a periodontium could be regarded as "perfect" in which one of the main constituent tissues exhibits a disturbance from the normal contour, size and anatomical relationship.

In closing, Dr. McDonough asserts that pyorrhea is no more curable to-day than it was twenty or thirty years ago, because it was always curable. This, I regard as an irrelevant statement. It might be said, on the same basis that diabetes yields no more readily to insulin to-day than it would have one thousand years ago. No doubt it always would have yielded to insulin as it does today, and diphtheria would have yielded to antitoxin, but it remained until the last few years for science to discover these secrets. So, in spite of the fact that pyorrhea was always curable, it remains, nevertheless, an enigma throughout the centuries until Riggs proclaimed, against the belief of his time, that from a clinical standpoint, the disease could be cured. Dr. Box has gone still further, and is the first dentist to submit evidence, not opinion, to prove this. In so doing, he corroborates the clinical views held by the dominant American School of Periodontists.

Nitrous-Oxide Oxygen Anaesthesia*

E. ROY BIER, D.D.S., WINNIPEG, MAN.

I SHALL not bore you with a recitation of the history and progress of anaesthetics or their application and I shall confine myself chiefly to our most commonly used anaesthetics, *Nitrous-Oxide* plus *Oxygen* and *Block Anaesthesia*, by *Novocain* and its derivatives.

*Read before the Saskatchewan Dental Association, Moose Jaw, June, 1924.

Their triumphs over pain are a well-known tale, but the different dosages, symptoms and reactions cannot be accurately tabled, as each person is generally a rule unto themselves, but the great underlying essential principles of anaesthesia are never varied.

Failure to induce anaesthesia may generally result from lack of knowledge, under-dosage. There are three stages of anaesthesia. The third stage is surgical anaesthesia, and this again is subdivided into three planes; with some patients operations can be successfully carried out in the second plane of the third stage of anaesthesia.

In others, where secondary saturation is an essential, the third plane of anaesthesia must be reached. Then oxygenation of the patient by direct flow is directed to keep the patient alive, and also to keep them from passing into fourth stage, which is usually next door to death: so the anaesthetist must understand his apparatus, his anaesthetic and his patient.

The common cause of complaint lies here: lack of knowledge. Knowledge is obtained by experience under proper instructors. The path of danger lies somewhat ahead of us if we do not quickly observe these symptoms, as the action of the drug we use is so rapid. Do not misunderstand me, Nitrous-Oxide Oxygen, from a chemical standpoint, is considered the least dangerous of all anaesthetics, but from a clinical standpoint is more rapid in absorption than ether or chloroform, and hence must be thoroughly understood.

Let us first consider the apparatus. The Heidbrink, McKesson and Clark machines are all high pressure machines; while the Gwathmey, Forreger, Ecker, and Connell machines are low pressure machines. Each manufacturer to-day claims a superiority for his product, and I am not in a position to recommend any one to the exclusion of all others.

For convenience of administration, I am partial to high pressure apparatus because the induction period is about a quarter the time of the low pressure machines, and a nervous patient, who has perhaps not received preliminary medication, is more easily controlled.

The weakness of human nature always waits for miracles to happen. We get tired of routine which is ordinary, we always look for methods which are singular or spectacular. The normal man leads a normal life, the planets revolve in the normal plane; by this I mean the common way of things is, after all, the best. It is the superior arrangement of the universe, and so the miracles are abnormal, they compensate for abnormality; and so if you have a normal patient, then uncommon methods need not be resorted to in giving anaesthetics.

The patient quickly follows instructions, breathes normally through the nose, does not take long, deep breaths; tell them this is an ordinary sleep. Don't instruct them to take a deep breath, unless they have particularly shallow breathing; ordinarily tell them to breathe

naturally, then if excitement or fear prevents them from doing this, and they do abnormal stunts, try and make them act natural. In the quiet of your own office this is easier accomplished than elsewhere.

The A B C's of anaesthesia should be in the anaesthetist's brain. He should co-ordinate the normal points of symptomatology of anaesthesia, divided under the headings of different individuals, *children* and *adults*, men and women, anaemics and plethorics, normal and abnormal individuals.

We must first learn the primary processes of mathematics, and so we must master the primary needs of normal anaesthesia. *Next* we should understand the chemical and therapeutic actions of the agents or drugs we administer; and *next* we should be thoroughly acquainted with the apparatus we are working with.

Children are harder to anaesthetize than adults because of fear, and lack of co-operation. *Crying* produces mouth breathing; mouth breathing means inhalation of air; air means 79% nitrogen, which fills up space and makes for uneven anaesthetic mixture during induction period, which might cause a pushing of anaesthetic vapor, under pressure which could over-dose the young patient.

I would rather give Somnoform with a face inhaler for any struggling, scared child. Important point to remember: children should not be forced under gas pressure. This is apt to produce anaesthetic shock.

Children are susceptible to anaesthetic shock, when closed apparatus is used, and too much pressure used.

I would in normal cases *suggest* something pleasant and keep the child's mind on something else, a bunny story or a child's motion picture, or dolls, etc. I would ask the child questions to make him talk, and I would lead his conversation into channels upon which he was interested, every once in a while reverting to instruction of the anaesthetic; finally, when I would apply the inhaler, I would ask for his co-operation.

INDUCTION PERIOD—Child should not receive over $2\frac{1}{2}$ gals. per minute with 5 to 7% oxygen, for a few minutes, then reduce oxygen until anaesthetized, and when completely asleep give as much oxygen as required. That technique of giving oxygen at the start of the anaesthetic does away with jactitation in about 75% of cases, which is so common under Nitrous-Oxygen anaesthesia.

CHAIR ADJUSTMENT—Have the chair almost horizontal (this prevents slipping out of the chair), with the arms of the chair adjusted close in just before operating. If at all possible, do not allow parents to remain in the operating room. Try to convince them that you are carefully guarding the welfare of the child, and have them leave the surgery.

Crying under Nitrous-Oxide does not necessarily mean that the

child feels any pain. This does happen occasionally and the child not feel anything or even remember the fact that they were crying.

Have the expiratory valves wide open for children, so as to wash the lungs with the proper amount of anaesthetic and reduce the pressure. Most anaesthetists wish to add a small quantity of ether in children to allow for relaxation, then shut off the ether and increase the oxygen, keeping the color good at all times.

Shock in children—All scientists agree that children are more susceptible to shock than adults.

Preliminary medication and mental suggestion may be necessary in some patients; anaesthetic shock may be produced in three ways:

- (1) By giving an over-dosage.
- (2) By giving too light an anaesthetic (under-dosage).
- (3) By failing to keep an open airway.

Corrections—(1) For over-dosages: force direct oxygen; (2) under-dosage: shut off oxygen; (3) keep airway open by pulling mandible forward, pulling tongue forward by tongue depressor or Connell airway. Use packs with a strong string attached, so that no throat packs are inspirated into airway. Packs prevent foreign particles or blood from going or falling into the throat, or being drawn into throat by inspiration. The space between the external orifices and the epiglottis has been called the "*death space*," because this space causes more trouble to anaesthetists than all other troubles combined.

Shock and death are more often caused by a closed airway than almost in any other way. This is caused by swelling of the mucous membranes; also by the relaxation of the muscles of the tongue, and the tongue dropping back and closing of the glottis.

Tongue stertor may be often prevented by having the head placed sideways, either the right or left side. The patient's head should be supported so that no effort is thrown on the neck muscles.

Try and remember this: artificial airways are a very necessary part of an anaesthetic's equipment,—Hewitt's, Connell's, Ferguson's, etc. If the forcing of the oxygen under pressure should not revive the patient, a child should be quickly inverted, grabbed by the heels and held upside down; swing gently back and forth and have assistant slap the patient on the back; also massage abdominal muscles which spreads the circulation. In shock the abdominal viscera have a loss of abdominal pressure. Now the viscera are capable of holding nine times the whole quantity of blood in the body, and so it is necessary to distribute that back to the heart and brain, etc.

Inversion supplies the brain with blood, but this is no good unless you have an open airway. Inversion spreads the circulation from the abdominal viscera back to the heart.

Inversion plus swinging mechanically expands and contracts the

chest like a bellows; this allows air to rush into lungs. It also distends the heart and intercranial vessels.

If the patient happens to be an adult, stand up on the dental chair, and grab by the knees instead of the heels. This should be kept up for at least six minutes, and done as vigorously as possible.

Hypodermics of camphor oil, or strychnine sulphate in Creeley's units, may also be aids.

Lastly, the stretching of the sphincter ani muscles might be resorted to if necessary. First respiratory movements would perhaps be so shallow as not to be noticeable; however, they would soon become spontaneous, and natural breathing follows. Giving of enema—warm water—Saline preferred, raises the blood pressure. Bandaging the abdomen fairly tightly, but not so as to interfere with free respiratory movements, also raises the blood pressure.

Trauma, under tooth extraction, is a negligible quantity.

Adults' Technique: All I have said about suggestion and mental equilibrium is also applicable to the adult. The great trouble here is insufficient anaesthetic. Give 4 or 5 gals. Nitrous-Oxide for about one minute—without oxygen addition,—then add 7% oxygen for one minute and shut off until patient is asleep. Then add 7% oxygen, or as much as required.

Anaemic patients tolerate more oxygen than normal patients.

Plethorics require little or no oxygen until they are asleep.

Important above all things is to have a nasal inhaler adjusted or packed so as to exclude all air and have it non-leaking.

Next of importance, the expiratory valve, in cases of deep breathing and patients normal. *Patients of an athletic type*—the expiratory valve is nearly closed so as to increase the pressure, produce greater re-breathing and give a more concentrated Nitrous-Oxide mixture, and the lungs are not emptied of too much carbon dioxide, which produces a condition of acapnia.

However, too much and too long re-breathing results in post-operative discomfort and headache, and it also raises the blood pressure distinctly at the beginning of the operation. If a patient has an already high blood pressure, this must be watched, in case of arteriosclerosis. Blood pressure drops considerably when the expiratory valve is raised after a three-minute concentration has been carried out; then flush the patient with oxygen only for a moment and reduce the pressure, and then regulate the amount of oxygen necessary to keep the patient asleep.

Cyanosis—This blue condition of the patient is what scares most anaesthetists; however, Nitrous-Oxide cyanosis is not as dangerous as ether or chloroform cyanosis, but most physicians do not recognize this, and for this reason alone are not favorable to the use of Nitrous-Oxide. I have seen patients cyanosed for two hours under Nitrous-

Oxide without any post-operative effect. However, cyanosis is an index to the depth of anaesthesia and must not be sneered at. See that the airway is cleared; it might mean an obstructed airway. Determine whether the patient has labored or stertorous respiration. I am more alarmed at a *death-like pallor*, than cyanosis, as this is *followed by respiratory paralysis if carried too far*. Death-like pallor means a drop in the blood pressure; quickly withdraw the Nitrous-Oxide and give sufficient oxygen to get your patient back to normal without waking the patient up altogether. Then re-anaesthetize them and, if I am not mistaken, pressures can be kept low, air valve (expiratory valve) can be kept fairly high, rate of flow can be reduced to three or four gals. per minute, and oxygen percentage raised. If necessary, add a little ether. However, if cyanosis is the bugbear to keep you from using it, and you demand a pink patient with the addition of oxygen at all times—*add* ether or Somnoform, as I will demonstrate the addition of Somnoform in my Clinic. This synergist can be completely washed out of the patient's lungs by direct oxygen flow at the completion of the anaesthetic.

Pressure in re-breathing bag is important. Most people do not emphasize this point, but it should at all times be taut or expanded during expiration, and it should not be entirely emptied during inspiration. McKesson and Clark have bags that can be regulated, and hence are an improvement over the others where this is not obtainable.

McKesson points out that the largest percentage of carbon dioxide from expired gases is the last part of the expired gases.

Gwathmey says the pressure in the re-breathing bag should be so regulated that the pressure under the mask does not exceed 2 m.m. of mercury.

Mucus in Throat and Mouth—This is usually most noticeable under ether anaesthesia, but it is also noticed under Nitrous-Oxide, and the mucus should be wiped out by the use of gauze and artery forceps; it is usually noticeable under light anaesthesia, and as the anaesthesia becomes deeper it disappears.

Sweat glands usually become quite active during presence of cyanosis or deep anaesthesia, which is of the cold perspiration type, and this subsides with lighter anaesthesia and more oxygen addition.

Warmed agents reduce the quantity of saliva and mucus, and also eliminate excitement to some extent.

Laboratory experiments showed that animals killed by warm agents did not have convulsions before death, and cold anaesthetics caused convulsions and death in twelve to twenty-eight minutes sooner than warmer anaesthetics.

Reflexes—Corneal,
Respiratory,
Circulatory and *Nervous system*.

In the third stage of surgical anaesthesia under Nitrous-Oxide, when pulse is full and regular, breathing is automatic and regular. The lid and Corneal reflexes are abolished; the pupils are usually dilated and the eyeball is fixed, slightly rolled upward and inward, and the pupil slightly dilated. Once in awhile we meet a patient where the muscles are not relaxed, the eyeball slightly rolls and the pupils are not enlarged, but judgment of the regularity and depth of the breathing is the surest guide to the anaesthetist. The size of the pupils may vary with the preliminary medication.

Reflexes—The sequence in which the parts of the nervous system are involved, according to physiologists and anaesthetists is as follows:

- (1) The cerebral cortex is involved.
- (2) Next the cerebellum and basic ganglia.
- (3) The sensory centres of the spinal cord.
- (4) Cerebro-spinal motor tracts.
- (5) The respiratory and vasomotor.
- (6) The cardiac centres.

(Note that respiratory precedes circulation, and it is more important to watch the respiration than the circulation.)

- (7) The inhibition of all centres and death follows.

With Nitrous-Oxide the special senses are abolished in the following manner: *sight* is lost before *hearing*, and *taste* persists longer than any of these. *Hearing* is the first to reappear, and silence should be maintained before the patient goes to sleep and during the waking stage,—loud noises tend to excite the patient. Some patients have died after a few inhalations of chloroform at the beginning of an anaesthetic, before consciousness was lost (probably physis in origin), and here is where preliminary medication is valuable in these neurotic patients. *Circulatory reflexes* are observed during a rapid rise or fall in blood pressure. *Respiratory reflexes* are noticeable, such as coughing, retching and difficult breathing, and likely to occur in lighter anaesthesia; a few words kindly spoken, reassuring and instructing the patient, are here indicated.

Men are harder to anaesthetize than women, because they smoke and drink more. More men are addicted to drugs than women; athletes are harder to anaesthetize; outdoor workers are harder to anaesthetize than sedentary workers, and most women have sedentary occupations. Men are not so susceptible to suggestion, and become more easily excited because they have more hazardous occupations. They weigh more, have more *avoirdu pois*, and require more anaesthetic than a smaller person; are more often plethoric or full-blooded than women. The athlete, alcoholic and drug addict all should have preliminary medication,—viz: Chloretone 5-15 grains one-half to one hour before, morphia 1-6 grain half an hour before.

TREATMENT BEFORE OPERATION.

- (1) Premedication—Chloretone or morphia.
- (2) Lack of food—miss one meal.
- (3) Elimination of bowels—(enema).
- (4) For bleeders—give 80-150 grains Calcium Lactate in 10-grain doses over a period of two or three days before operation.
- (5) If the above is impossible inject 2 c.c. of P. & D. Haemostatic Serum intramuscularly, one hour before operation.
- (6) Corsets and waistbands *must* be loosened.
- (7) The bladder should be emptied.
- (8) A capable nurse can often mentally reassure the patient that all will be well, and do much to assist the operator.
- (9) In a given history of acidosis give sodium bicarbonate in half teaspoonful in wine glass of water three times a day before meals on day previous.
- (10) In a given history of kidney involvement, consultation with the physician is important, and too many teeth should not be removed at one sitting.
- (11) In goiter cases preliminary medication is advisable and a Connell airway should be on hand during operation; stomach and bowels should be empty. Airway is introduced before closure takes place. There is a danger here of regurgitated food blocking the airway. Free administration of drinking water the day before is of assistance.

FEAR AN IMPORTANT FACTOR.

Animal experiments show that where animals were frightened and *not* hurt, they exhibited brain cell changes. Some were damaged, rapid heart, accelerated respirations, prostrations and tremors, as well as a rise in temperature. This shows a form of physical exhaustion due to fear. Patients exhibit similar tendencies.

After taking morphia patients should lie down and rest for half an hour. It lessens the amount of anaesthetic, reduces vomiting, reduces liability to shock, and eases post-operative pain. Contra-indications of morphia only in acute or subacute nephritis, where the reflexes are not to be abolished and there is danger of coma. (These patients are rare in a dental office.)

TREATMENT DURING ANAESTHESIA.

- (1) Have chair in reclining position, keeping the head in line with the heart.
- (2) Keep respiration normal, if possible, by oxygen regulation.
- (3) Keep open airway.
- (4) Have gauze packs in mouth, which somewhat prevent mouth breathing.

False Breathing—Sounds of respiration indicate narcosis, but other reflexes are not abolished; check up and do not start to operate, as it will produce excitement and uneven anaesthesia.

Muscular twitching or jactitation is a sure sign of too deep a narcosis,—add more oxygen.

Have gas warmed by electric warmer, or hot-water bag, placed over machine. Respiration aids the heart in producing blood pressure in the human subject; intra-pulmonary pressure is increased during exhalation, aiding the heart to force the blood out of the chest. During inhalation the blood is drawn out of the veins leading into the thorax, at the same time the capillary resistance in the lungs is reduced so the right heart can the more easily force the blood to the left side, when exhalation begins: the lungs squeeze out the excess blood into the left heart, increase intra-pulmonary pressure by 5-10 m.m. mercury.

Briefly, the heart is the pump, the arteries admit the blood from the heart by distension. The arterioles are shut-off valves controlling peripheral resistance, and determine the volume of blood to pass through a certain group of capillaries; the capillaries and veins act as a return tube to the heart and lungs.

POST-OPERATIVE TREATMENT.

- (1) Do not raise the patient too quickly.
- (2) Do not allow patient to swallow blood; insert gauze or cotton.
- (3) Allow patient to rest quietly on a couch if necessary.
- (4) If patient still feels nauseated after fifteen minutes, administer Bromo-Seltzer—one teaspoonful in small glass of water for ordinary cases.
- (5) If patient feels chilly—cover with warm blanket or robe.

Pregnancy is not a contra-indication for administration of N_2O .

Dangers of abortion are greatest at the beginning of the third and seventh month,—not much danger if the muscles of the uterus are not allowed to contract and the patient is not allowed to become cyanosed. Most patients tolerate a larger quantity of oxygen at this period.

Alcoholics—One ounce of whiskey in 8 ozs. of saline, per rectum, given one hour before, plus 1-6 gr. of morphia one-half hour before. The anaesthetic acts more satisfactorily. Ether, by drop method, is better than a closed method, as these patients suffer from oxygen deprivation.

Pleurisy-empyema—Abscess of the Lung—use Nitrous-Oxide and oxygen (never ether)—plus morphia 1-6 grain, or chloretone—one hour before.

And now, gentlemen, I appeal to your good judgment in the interest of Science to acquaint yourselves with this instrument of

"Anaesthesia," both local and general Anaesthesia. We are standing on the threshold of the 20th Century, and Anaesthesia is bound to make even greater strides in the future than in the past; let it make a friend of you, so you will become more friendly to Anaesthesia, and it will make friends for you; it will bring you happiness and a measure of prosperity, as it will banish pain. No other calling in life has quicker rewards than this; it will bring gratitude from your patients, and gratitude brings its own reward.

Go home to your offices and practise it daily; do not let apprehension or fear prevent you from employing it daily in your offices, and let us not in any way crucify our patients, but rather let us crucify pain, so that it cannot be a part of our work. It will require hard work and repeated effort to insure success in any undertaking, and all the study, thought, and practice we give to Anaesthesia will bring its rewards and blessings. I know how lightly I have passed over such a vast subject, and how much I have left unsaid or unexplained. I only hope I have shown some thoughtful person where anaesthetic truths lie, so that you may gather them up and use them in your practice.

Full Denture Construction for the General Practitioner*

BY I. LESTER FURNAS, D.D.S., CLEVELAND, OHIO.

*Professor of Prosthetic Dentistry, Dental School,
Western Reserve University.*

(Continued from last issue.)

BITE-PLATES.

AFTER the casts are made the next step is the construction of the bite-plates. As mentioned in a previous chapter psychology plays an important part throughout the construction of a set of artificial dentures. When the bite-plates are finished and placed in the mouth for the first time, the patient is very likely to form certain secret opinions regarding the finished dentures, and these secret judgments will be either very helpful or very harmful to the operator.

If thick, heavy, rough, and bulky bite-plates that have no adaptation are placed in the mouth, even though the operator may explain that they are "only wax" and not in any way like the finished dentures, the patient may secretly form a lasting dislike for any such

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substance in the mouth. Then and there will be lost one of the positively necessary essentials to success—the proper co-operation of the patient. Most dentists have had the experience of having a patient who positively makes up his mind before the dentures are completed that he never will be able to wear them. These cases usually constitute sad remembrances for both patient and dentist. Often the first seeds of dissatisfaction were planted by means of the first insertion of the bite-plates.

When light, thin, smooth bite-plates are constructed, that have good adaptation, they not only perform very much better the functions of bite-plates, but are decidedly comfortable and restful to the patient, thereby stimulating instead of destroying co-operation.

When all teeth are extracted there is a tendency to abnormal closing of the jaws; and this unnatural pull or strain on the muscles soon makes them become tired and painful, and anything which will tend to hold the jaws in their natural relation, as the bite-plates do, will give the patient a restful and comfortable feeling.

In order to secure this desired thinness, lightness, and adaptation, and at the same time give the bite-plates the strength necessary to withstand ordinary biting pressure without changing shape, it is necessary to *reinforce* them. This is done by using a hard, rigid wax, that is adapted to the cast, and the bite-rims replacing the lost teeth added to this, but constructed of much softer wax.

There are several different kinds of this hard reinforcement wax on the market, most of which will serve the purpose very nicely. The *thick* Ideal base-plate wax manufactured by the S. S. White Co. has proven most satisfactory in the hands of the writer. This is a hard shellac wax. It takes a very close adaptation to the cast, and has all the strength necessary for the requirements of a bite-plate. It also is just the correct thickness for the palatal portion of the upper denture, thus eliminating the necessity of additional finishing or scraping to this portion of the denture.

When the wax is wilted or pressed to place on the cast, it does not have a tendency upon cooling to straighten out or pull away from the cast, thereby breaking the adaptation in the mouth. This feature is perhaps the most objectionable in the majority of the other hard waxes.

Some prosthetists recommend the use of a metal reinforcement such as Ash's Metal No. 7. This type of reinforcement is very satisfactory when correctly used, but in many cases, where a heavy biting stress is applied, the bite-plates will have a tendency to spread at the heels. This can partially be overcome by soft-soldering a piece of 16-gauge fuse wire over the palate from heel to heel of the upper, and around and just to the lingual of the crest of the ridge of the lower. This method also requires additional waxing over the palatal

portion of the upper base in order to give it sufficient thickness for proper finishing.

The technique for using this metal reinforcement is first to burnish it closely to the cast, then trim to the desired size and shape, and swage to a close adaptation in one of the many types of swaging devices. The additional equipment required for this technique makes it more or less impracticable in the office of many general practitioners of dentistry who are not equipped for this kind of work. This, however, should not be held to discredit the efficiency of the method.

The use of the thick Ideal base-plate wax does not require any additional equipment, and there is no reason why it should not be used in the practice of every dentist who is called upon to construct artificial dentures. The technique is simple and the results are most gratifying. It is used as follows:

The upper cast is placed on the laboratory bench with the ridge presenting upward. A sheet of the thick Ideal base-plate wax is now passed through an open bunsen flame until it begins to soften. It is then centred over the cast and the palatal portion closely adapted, paying no attention to the ridges or any other part of the cast. This is done to make sure than an even thickness of the wax is maintained all over the palatal portion. If the wax in this part is allowed to stretch or thin out in places it will give an uneven thickness to the palatal portion of the finished denture, and may cause serious trouble to develop during finishing.

When the palatal is closely and evenly adapted, then a large brush-like flame is slowly passed back and forth over the wax lying in position on the cast, making sure to give the heat time to be evenly absorbed by the wax. Presently the wax will be wilting to its approximate position on the cast. The flame is then removed, the thumbs and fingers moistened, and the wax burnished tightly to the surface of the cast. Care should be exercised to avoid over-heating the wax, which will be evidenced by bubbling. This may sometimes cause the wax to adhere to the cast. If moderate care is used this will seldom occur, and always can be avoided by lightly burnishing No. 4 tinfoil over the cast with a soft cloth or a ball of cotton before making the wax conform to the cast. The wax is now closely adapted to the palatal portion and well over the crest of the ridge, but not in the "turn" of the cast.

A knife or wax spatula is now heated almost to redness and the wax is cut or grooved across the posterior part from the right heel to the left heel, thus marking the posterior margin of the denture. It is next passed around the buccal and labial portions following the outline of the border of the denture, but about one-eighth of an inch above the turn of the cast. The object of this is to keep the thick Ideal base-plate wax well away from the peripheral turn of the cast.

Two of the principal reasons for using this wax, it will be remembered, are for strength and adaptation; and inasmuch as strength is not required in this turn and equal adaptation can be much more easily secured by soft paraffin and beeswax, it is not necessary to carry this wax closely into the turn of the cast. Another reason for this is the fact that all heated waxes have a tendency to change form more or less during cooling. This change takes place in proportion to the bulk of wax. If the wax is carried closely into this turn and then folded upon itself to give a round smooth margin, as is the technique for this procedure, it only increases the bulk of wax and the tendency to change. The baseplate now being outlined laterally, cuts are made at convenient points with a hot knife to aid in breaking away the excess wax.

The excess is now broken away and the margins inspected to see that the adaptation to the cast is perfect. If at some place the wax does not fit snugly to the cast it is again locally heated with a very small pointed flame and pressed tightly to place. The wax is then cooled and removed from the cast and all margins smoothed and rounded off by scraping with a knife or a vulcanite scraper. It is next replaced on the cast.

The technique for adapting the thick Ideal base-plate wax to the lower cast is almost the same as described for the upper. The sheet of wax is roughly adapted to the cast after first having been softened by passing it through the flame.

The large brush-like flame is then pressed back and forth over the wax in place on the cast until it is sufficiently warm so that it may be burnished tightly to place with the thumb and fingers.

The base is next outlined with a hot knife or spatula, keeping approximately one-eighth of an inch inside of the marginal turn of the cast. Grooves are then cut at convenient points to aid in breaking away the excess wax.

The excess wax is then removed and the margins inspected to see that the adaptation is perfect. In case imperfections are present they are corrected as explained for the upper. All margins are next rounded off and the wax reinforcement placed back on the cast.

The writer never has had the experience of having a lower bite-plate of this kind change in the mouth sufficiently to cause trouble; however, in case the operator is afraid this may happen, due to the excessively strong biting pressure, it can be avoided by contouring a sixteen-gauge German silver wire to fit the case and imbedding it in the wax just lingually to the crest of the ridge.

(To be continued).

The Metric System

BY F. A. GRAFE, A.B., M.D., CINCINNATI.

METER, the unit of measurement of length, 40 inches long, concerns the man who deals in comparatively large dimensions.

Generally speaking, the unit is inapplicable in the daily transactions of members of our profession. Being a unit of the metric system, a per mille system, the meter is subdivided into one thousand parts each part forming a new unit, bearing the distinctive name *millimeter*. For purpose of ready comparison, we may state that the long diameter of the distal phalanx of your thumb measures twenty-five millimeters. Thus, "by the rule of thumb," you may readily measure anatomic dimensions. In all general measurements, the millimeter unit alone should find acceptance in our daily transactions. Such units as decimeter and centimeter should be cast aside, for they must necessarily lead us into the use of fractions, which the metric system endeavors to avoid entirely.

To the microscopist, the millimeter unit is entirely too voluminous,—he divides this unit into 1000 equal parts, creating new units, *micrometers*.

For us, as general physicians and surgeons, there exists only one unit, applicable in the measurements of linear dimensions, the *millimeter*, its length being equal to the length of one twenty-fifth part of the length of the distal phalanx of your thumb, or the one twenty-fifth part of an inch. The unit of measurements of weight of solids is the gram. A nickel (five cents) weighs five grams, hence the weight of one gram equals the weight of one-fifth part of the nickel. Sub-divided according to the laws of the per-mille metric system, a milligram equals one-thousandth part of a gram. Gram and milligram are the units to be employed by you in your daily transactions involving weights of solids, whether such refer to drugs which you dispense, or to the body and any one of its parts which you endeavor to benefit. Avoid such terms as decigram and centigram, for they again will force you into the use of fractions. To express dosage, it becomes occasionally necessary to employ the term *microgram*, this being the one-thousandth part of a milligram. A single dose of the size of a microgram cannot be weighed on a pair of scales, but aggregations of micrograms form milligrams, which can be weighed on delicate scales.

In the book before me, I notice that the dosage of conium is quoted as 0.06 to 0.3 g. The figures, conveyed to my brain through the medium of my eyes, cause confusion—I fail to clearly comprehend the comparative values. To read the passage, I would either say: "naught decimal naught six to naught decimal three grams.

(which would cause more confusion), or "six centigrams to three decigrams" (Still more confusion!), or six one-hundredths to three one-tenths grams" (Despair!).

No wonder, you did not use the metric system heretofore! If, however, you fill in the proper quota of figures for milligrams, you will have 0.060 to 0.300. Then you would read, 60 to 300 milligrams, and the comparative values at once become evident, whether you view the figures or read them. The quantities in this book evidence the fact that they are values which have been translated, more or less literally, from the antiquated apothecary system. The dosages of drugs are not absolutely but only relatively such. It cannot be stated that the single dose of conium must never under all circumstances be less than 60 nor more than 300 milligrams, but that, in average conditions to average individuals, the use of conium in doses ranging from 60 to 300 milligrams has produced certain results. Quotations reading 50 to 250 milligrams would conform to the general acceptance of the metric system.

To a few drugs, the use of the microscopic unit, microgram, the one thousandth part of a milligram, is applicable.

Substances existing in the liquid state are to be measured in a graduate. The weight of a *grama* of water equals the weight of a gram of a solid substance. The presence or absence of final *a* determines whether the substance under consideration is to be weighed on a pair of scales or is to be measured in a graduate. A teaspoonful of water measures five gramas and weighs five grams. Hence, as far as water is concerned, the terms gram and grama are synonymous. The results are the same, whether you weigh a quantity of water or measure it in a graduate, but, generally speaking, it is less difficult to measure a liquid.

* * * *

Resume: Determine dimensions by the use of the term millimeter, determine quantities of solids by the use of the terms gram and milligram; determine quantities of liquids by the use of the terms grama and milligram. That is all there is to the use of the metric system, as far as you are concerned.—*Clinical Medicine*.

WHICH IS THE PREFERABLE technique to employ in order to get satisfactory gingival third inlays,—the direct or indirect method?

The indirect method is most satisfactory especially where the impression covers the greater portion of the tooth and the model is made of a strong investment. Wax can then be melted and poured into the cavity of the model, properly contoured, and cast directly into it.—*Dental Forum*.

The Place of Crowns and Bridgework in Modern Dentistry

AT the annual meeting of the British Dental Association at Edinburgh, which has just concluded, Mr. H. W. Bennette read a paper on collar crowns, in which he unsparingly condemned this method of saving teeth and in the discussion which followed it was apparent that most of his hearers agreed with him. In considering the evolution of operative dentistry from its lowly beginnings, there are certain methods which stand out as landmarks. Amongst them the use of crowns and bridges represents a notable change in the outlook of the modern dentist. It does not require a very long professional life to have witnessed the gradual evolution of crowns and bridges to their highest point of technical achievement, and their decline in popularity to the present time when so many regard them with disfavor. This decline is not due to the substitution of other methods of greater technical efficiency, but rather to a different outlook on the aims and objects of dental surgery. Even to-day it would be premature to regard the discussion on crowns and bridges as ended, and the obituary notice as read. There are still a large number of dentists, both in this country and abroad, who use these methods extensively. The pages of dental journals abound in advertisements of various appliances to facilitate the construction of crowns and bridges. A new edition of a popular text-book on crowns and bridges has recently been issued and will doubtless find many purchasers. But although there exists this discrepancy between the academic teaching of dentistry and its practice in many quarters, there can be no doubt that the modern trend is definitely away from these methods of saving teeth.

The reasons which led to the introduction and decline of these operative methods are instructive. Thirty or forty years ago, when great technical advances were beginning to be made in dentistry, the aim of the dentist was to save as many teeth as possible. The local hygiene of the mouth was not entirely disregarded, but it was looked at from a narrow point of view and without much regard to the general health of the patient. Many ingenious methods for splinting loose pyorrhoeic teeth were devised on the principle that all teeth which could be used without pain should be retained as long as possible. Relics of this attitude still exist, but they are fast passing away. When teeth were too carious to be filled the method of restoring them by an artificial crown of gold or porcelain was introduced. The crown was fastened to the root either by a collar placed over the root and cemented on, or by a post passing into the root canal and secured by cement. It is obvious that, even with the highest technical skill—

still more, if the crown is poorly constructed—there is a tendency for food and bacteria to collect round a device of this kind. In the case of collar crowns there is the added factor that there must be a ledge under the gum which collects debris, no matter how well constructed, and must act as an irritant to the gum and periodontal membrane. For this reason many dentists began to condemn this type of crown on the grounds that it predisposed to pyorrhoea, and was an unclean device. This feeling has been steadily growing, until there are few dentists to-day who would not agree that the collar crown is insanitary and should be abandoned. This is not to say that crowns as a whole are to be regarded as an illegitimate form of dentistry. There is still a wide field of usefulness for crowns, but with the proviso that not only must they be constructed with great accuracy, but also that the crown must fit the root edge to edge so that there is no ledge to collect debris. There has been so general a condemnation of crowns by doctors that it is well to make it clear that properly constructed, and in suitable conditions, a crown may be a perfectly scientific and hygienic method of conserving teeth. Any type of crown however, which involves a collar fitting over the root and extending below the gum margin is in the opinion of most dentists a form of conservative dentistry which leads to dental sepsis and should be discarded.

With regard to bridgework in so far as the abutments of the bridge which are placed on the supporting teeth are collar crowns, then the condemnation of such crowns applies to bridges also. But there is another factor. Each tooth is capable of slight independent movement under the stress of mastication, through the yielding of the periodontal membrane. This buffer-like action lessens the force of mastication. When two teeth are splinted together, as in a bridge, they must both move together, instead of independently, and the stress to which they are submitted will cause them to become loose. In the case of large bridges which bear a considerable amount of impact during mastication, the strain on the abutments will soon cause the loss of the supporting teeth. In the case of small bridges exposed to little or no strain, this factor may not be serious. Added to this there is also the factor of cleanliness. It is difficult to make so complex a piece of apparatus as a bridge self-cleansing. It tends to gather a debris far more than a crown, and may become a veritable trap for filth, well meriting the original condemnation passed on bridges by Dr. William Hunter. If the bridge is removable, the foregoing objection may have less weight. Such bridges call for a high degree of technical skill. They may have a legitimate place within narrow limits, but not to an extent which seriously qualifies the general distrust of bridgework as a clean method of tooth restoration. Since the advent of the X-ray has shown that pulpless teeth,

free from symptoms, may sometimes be infected at the apices, crowns have received additional blame. Sir William Willcox, for instance, has stated that all crowns should be extracted because of the apical infection so often present. There is some confusion of thought here. It is not the presence of the crown which leads to apical infection, but rather the infection of the pulp canal consequent on the death of the pulp. Crowned teeth are usually pulpless, but there is no evidence to show they are more frequently the seat of an apical lesion than pulpless teeth which have been filled. The logical extension of such an attitude would be to state that no tooth which had not a living pulp should be retained in the mouth, and that no treatment involving the root canals should be undertaken. This view has been put forward in America by some, but it does not appear to us that the facts warrant so sweeping a statement or so drastic a limitation of conservative dentistry. The presence of apical infection in some teeth which have been treated is a wholesome challenge to the dentist, for it raises the question as to whether dental technique is sufficiently thorough and scientific to exclude infection from devitalized teeth. The dental profession is fully alive to the gravity of this issue. Already the interest aroused has resulted in a notable improvement in root canal technique which warrants the belief that in the near future infection will be eliminated with certainty in the treatment of diseased pulps.—*The Lancet*.

AFTER PREPARING A TOOTH for a porcelain jacket crown, I find great difficulty in keeping the surrounding gum tissue normal until the crown is ready for setting.

The difficulty arises, perhaps, from a slight overhang or excessive pressure of the gutta percha crown against the gingival tissue. This can be remedied by taking two modeling compound impressions within copper bands and packing at once one of these with cement. By the time the shade is selected, the bite taken, etc., a hard cement model will be obtained, upon which a temporary gutta percha crown may be adapted and molded and the gingival trimmed to fit the shoulder exactly. This can be transferred to the preparation to readapt the cervical fit and contour. The outer surface is lubricated and then the crown is ready for cementation. Upon the patient's return, the gum tissue will be found normal and the shoulder in full view.—*Dental Forum*.

You cannot hit the bull's-eye every time you shoot, else there would be no sense in having circles on targets.—W. L. S.

Examination Results—Dominion Dental Council

The following have passed the D.D.C. examinations in the subjects indicated:

Operative Dentistry.	Physiology and Histology	Materia Medica and Therapeutics
Allan, G. W. Armstrong, W. F. Cathro, C. A. Cooper, F. B. Deegan, A. A. Fawlie, J. R. Henderson, W. S. Hughes, A. E. Munroe, D. H. McIntosh, C. E. Perkin, J. G. Shepherd, R. P. Shepherd, F. H. Sutherland, A. M.	Cooke, A. R. Connell, E. W. Darts, G. C. Deegan, A. A. Fawlie, J. R. Hughes, A. E. Hughes, R. W. Munroe, D. H. McBroom, R. E. McCarthy, T. G. Nathress, J. A. O'Connor, T. H. Phin, A. W. Sproule, F. E. Urie, E. H. West, J. F.	Browne, C. T. Butcher, E. C. Cooper, F. B. Connell, E. W. Darts, G. C. Dawson, W. G. Deegan, A. A. Fawlie, J. R. Hennigar, A. E. Hughes, A. E. Hughes, R. W. Johnstone, L. A. Munroe, D. H. Reeves, H. W. Sutherland, A. M. Thomas, W. G. Urie, E. H. West, J. F. Willigar, W. G.
Pathology & Bacteriology	Physiology (only)	Materia Medica (only)
Anderson, W. S. Armstrong, W. F. Browne, C. T. Cathro, C. A. Cooper, F. B. Dawson, W. G. Deegan, A. A. Fawlie, J. R. Hennigar, A. E. James, L. V. Johnstone, L. A. Munroe, D. H. Shepherd, F. H. Sutherland, A. M. Willigar, W. G.	Endicott, C. L. Thomas, W. G.	Cross, Sydney McBroom, R. E.
Jurisprudence and Ethics	Histology (only)	Therapeutics (only)
Anderson, W. S. Anthony, A. B. Armstrong, W. F. Cathro, C. A. Cooper, F. B. Darts, G. C. Deegan, A. A. Doan, F. W. Fawlie, J. R. Higgins, A. E. Munroe, D. H. McIntosh, C. E. Shepherd, R. P. Sutherland, A. M.	Demuth, A. H. Krieghoff, C. F. McLaughlin, T. E. Reeves, H. W.	Perkin, J. G. Shepherd, F. H.
Medicine and Surgery	Anatomy	Metallurgy (only),
Anderson, W. S. Cathro, C. A. Deegan, A. A. Fawlie, J. R. Godard, W. R. Munroe, D. H. MacIntosh, C. E. Shepherd, R. P. Sutherland, A. M.	Cooper, F. B. Deegan, A. A. Demuth, A. H. Endicott, C. L. Fawlie, J. R. Hughes, R. W. Kline, M. Krieghoff, C. F. Munroe, D. H. McCaffrey, I. M. McLaughlin, T. E. West, J. F.	Endicott, C. L. Garland, C. F. Hughes, R. W. McCarthy, T. G. Phin, A. W. Thomas, W. G. Urie, E. H. West, J. F.
	Prosthetic Dentistry and Metallurgy	Physiology and Histology
	Anderson, W. S. Armstrong, W. F. Cooper, F. B. Connell, E. W. Cross, Sydney Deegan, A. A. Fawlie, J. R. Forbes, R. M. Fraser, H. R. Hughes, A. E. Munroe, D. H. McIntosh, C. E. McBroom, R. E. Perkin, J. G. Reeves, H. W. Shepherd, R. P. Sutherland, A. M.	Butcher, E. C. Cooper, F. B. Connell, E. W. Darts, G. C. Deegan, A. A. Endicott, C. L. Fawlie, J. R. Haversbock, A. B. Hughes, R. W. Israel, L. G. Milburn, W. B. Munroe, D. H. McBroom, R. E. McCarthy, T. G. Phin, A. W. Reeves, H. W. Thomas, W. G. Urie, E. H. West, J. F.

SEPARATING MEDIUM.—Use French chalk for a separating medium in investments, and avoid the unpleasant mess associated with oil or vaseline.—*Dental Science Journal of Australia.*

Correspondence

MR. MULLISS, managing editor of *The Hamilton Spectator*, after reading Dr. C. N. Johnson's message to the Dental profession, published in the October issue of ORAL HEALTH, under the caption "Misunderstandings," wrote the editor as follows:

I like your friend Dr. Johnson's article on "Misunderstandings". It reflects a mind that is thinking clearly and cleanly. It offers advice and guidance well worth while, and is not preachy. But, Dr. Johnson asks a question which he does not answer.

He wonders "why we do not try harder to understand each other". The reason I would say is the love of self. The exaltation of self is the curse of the race; yes, the curse of humanity. If we were not continually and constantly thinking of ourselves and what affects our immediate personal interests, we might find time to give a thought to others.

We have received from great teachers such as Jesus Christ and Buddha certain rules of life and conduct that are so simple we never think of putting them into actual practice. The Christ advised us to love our enemies, to bless them who curse us, to do good to those who hate us and pray for those who spitefully use us and persecute us.

He emphasized this by observing that if we loved only those who loved us we are no better than the despised publican. He also warned against laying up treasures on earth, an injunction universally scorned and rejected. Impossible and impracticable we say, even when we have never tried. What is the use of Divine instruction if we do not try to apply it to our daily life. Why not aim to live our creed in our deed.

Judge not lest ye be judged, is another admonition we forget. The exercise of judgment is a prerogative of the Deity. "Vengeance is mine" says the Lord, or Law "I will repay." Let us kindly note who will do the adjusting and the repaying.

Whether we limit our conception of Deity to an anthropomorphic God or extend it to an Eternal Divine Principle and Law, we must recognize the impartiality and impersonality of the Law. "As a man sows that shall he also reap." If we sow anger, hate, envy, malice, prejudice we shall reap in return the effects of those causes we have set in motion. With an understanding of that law, it is a simple matter to be happy and helpful. All we have to do is to sow the seeds of love, of altruism, of charity, of sympathy and our own will come back to us. What we have sown in ignorance we must pay for, but when we come to recognize and operate this simple law proclaimed of Paul and Jesus, (the law of compensation Emerson calls it and the law of Karma it is named Eastern philosophy) the fault and punishment are ours if we do not put into practice.

Buddha explained that hating never ceased by hating, that hating ceased only by love. That is, when we love those we now hate, then hatred dies and love takes its place. It is a safe rule of life not to be disturbed at the unfair conduct of another towards ourselves. It is what we ourselves do that counts. What does the withholding of our forgiveness to another amount to after all? It amounts to this, though, that we are creating and retaining thought forms, which are tangible living entities,—that befoul and befog our mental atmosphere.

Let us, then, if we are wise, create an atmosphere that is worth living in, and which we can radiate for the good and the happiness of all those with whom we come in contact.

Obituary

THE LATE DR. FRANK W. RYAN.

DEAN, DENTAL FACULTY, DALHOUSIE UNIVERSITY.

NO local announcement of like character in a number of years has been received with a more profound sense of shock than that of the sudden death, shortly before midnight on Friday, 17th October, 1924, at his residence, 7 Spring Garden Road, Halifax, of Dr. Frank W. Ryan, Dean of the Dalhousie Dental Faculty, and a man professionally known throughout Canada as one who exemplified the highest professional ideals, and whose genuine public spirit and ardent interest in all relating to the development of dentistry, was recognized wherever he was known.

Tribute was paid in the public press to the great work of the leaders of Nova Scotia dentistry, by Mr. G. Fred Pearson, Vice-Chairman of the Board of Governors of Dalhousie University, in the following words:

"Under the leadership of the late Dr. Frank Woodbury and Dr. F. W. Ryan, the dental profession of Halifax has made a splendid and most substantial contribution to the cause of higher education in the Maritime Provinces. The establishment of the Dental Faculty of Dalhousie was due to the efforts and unselfish service of these men. The higher standards which they set for the Dental School have been adopted as the model for other dental schools, and under their direction the Faculty of Dentistry of Dalhousie University has a continent-wide reputation and ranks with the leading schools of America."

"The late Dr. Ryan succeeded Dr. Frank Woodbury as the Dean of the Faculty and gave unstintingly of his time and really great ability to its direction. He was most highly esteemed by the students, the Senate and the Board of the University. He was foremost in everything which made for the advancement of the school and the better instruction of the students. His lamented death leaves a vacancy in the ranks of its teachers which the University can not easily fill. The Board of Governors of the University, as well as the members of the staff and the student body, will learn of Dr. Ryan's death with keen regret. He will be remembered by them as a leading member of his profession, a splendid teacher and a true friend."

Deepest sympathy is expressed to Mrs. Ryan in her sad bereavement.

Out of respect for Dean Ryan no dental classes were held in Dalhousie all day the following Monday, and a general suspension of classes throughout the University was arranged for Monday afternoon, to enable students and staff of all Faculties to attend the funeral service.

THE LATE EDWARD R. TEMPLE.

MEMBERS of the dental profession extend sincere sympathy to Mr. and Mrs. Harry P. Temple in the sad loss of their son, Edward R. Temple, who was fatally injured in an automobile accident on 15th November, 1924, while motoring on North Yonge Street, Toronto.

The late Mr. Temple was a universal favorite and throughout his college and business career always gave his very best effort. He was 21 years of age and had been employed for upwards of two years in the mail order department of the Ash-Temple Company. After graduation from St. Andrew's College, Mr. Temple joined the 48th Highlanders Regiment and was recently awarded his Sergeants' stripes. He was an ardent lover of the great out-of-doors, and keenly interested in athletics of every type.

Floral tributes were received from every part of Canada and the United States, and after the service these were sent to the Toronto Hospitals for distribution among the patients.

* * * *

THE LATE DOCTOR R. H. WOODBURY.

ON Monday, 27th October, 1924, Dr. R. H. Woodbury, Lecturer in Prosthetic Dentistry and Metallurgy, Faculty of Dentistry, Dalhousie University, passed away as a result of an attack of appendicitis. The immediate cause was a heart complication following an operation for removal of appendix.

Within a few weeks the Halifax Dental Society has lost three of its most prominent members, Doctors Ryan, Woodbury, and Dobson. The Society never failed to look to these three men for active support of every local dental effort, and their absence will be sorrowfully felt by their confreres.

The late Dr. Woodbury was a son of the late Dr. Hibbert Woodbury and nephew of Dr. Frank Woodbury, who served so acceptably as Dean of the Dental Faculty at Dalhousie for many years.

WHAT CAUSES TENDERNESS OF TEETH used for abutments when so-called hard gold is used in constructing a bridge?

Trauma and tenderness result from malocclusion. It may be that the cusp is too high or too far buccally or lingually or the cusp plane may be striking abnormally. It is best to have the patient return within two or three days after setting the bridge so that such areas may be adjusted.—*Dental Forum*.



BRITISH COLUMBIA—A. T. OBERG, D.D.S.

825 Granville St., Vancouver

ALBERTA—JOHN W. CLAY, D.D.S.

914 Herald Bldg., Calgary

SASKATCHEWAN—C. W. PARKER, D.D.S.

Imperial Bank Bldg., Regina

MARITIME PROVINCES—J. STANLEY BAGNALL, D.D.S., Commodore Apts., Halifax, N.S.

MANITOBA—W. W. WRIGHT, D.D.S.

767 Warsaw Ave., Winnipeg

ONTARIO—Lieut.-Col W. G. THOMPSON

28 King St. West, Hamilton

QUEBEC—ARCHIE N. JENKS, D.D.S.

Medical Arts Bldg., Montreal, Que.

MARITIME PROVINCES.

THE annual meeting of the Halifax Dental Society was held on the 30th of September. The following officers were elected for the season of 1924-25: Pres., Dr. R. H. Woodbury; Vice-Pres., Dr. C. B. H. Climo; Sec.-Treas., Dr. J. Stanley Bagnall; Property Officer, Dr. F. W. Ryan; Complete Executive, Dr. G. R. Hennigar.

The evening was devoted to a discussion of plans for the winter session, and to reports from Dr. G. K. Thomson and Dr. F. W. Ryan, on the D.D.C. and C.D.A. meetings at Vancouver. Dr. Thomson also explained, in some detail, the plans for the C.D.A. meeting in Halifax in 1926. He mentioned the names of some very prominent men who had definitely promised to be present at the meeting. He mentioned the meeting of the International Dental Congress in Philadelphia the same summer, and the advisability of having the C.D.A. dates so arranged that they would not conflict with the dates of the International, but either just before or just after, so that it would be possible to take in the two meetings in the one trip.

* * *

Dr. Hazel Thomson has been appointed full time School Dentist for the City of Halifax. This is the first full time appointment in Nova Scotia. Sydney has had a half time School Dentist for about a year. The work in Halifax in the past was done by Dr. G. N. Stults and Dr. S. G. Ritchie, who devoted three half days a week to the work, and by the Dalhousie Dental College clinic.

* * *

Dr. Roberta Forbes has been appointed Pre-School Age Dentist on the staff of the Massachusetts-Halifax Relief Commission. This work was formerly carried on by Dr. Arrabella MacKenzie, who moved to Toronto. This clinic was opened in the Spring of 1921, and since then has been open three mornings a week. The need for the clinic has been so fully proved that Dr. Forbes is devoting her whole time to the work.

The Profession in Nova Scotia has suffered a distinct loss in the death of Dr. F. W. Dobson in September. Dr. Dobson had been one of the most faithful workers in all that related to the advancement of his profession. He had at different times been President of both the Nova Scotia Dental Association and the Halifax Dental Society, and at the time of his death was on the Provincial Dental Board.

* * *

At a recent meeting of the Prince Edward Island Dental Association the following officers were elected for the season 1924-25: Pres., Dr. A. S. Palmer, Charlottetown, P.E.I.; Vice-Pres., Dr. W. L. McLellan; Sec.-Registrar, Dr. J. S. Bagnall; Complete Executive, Drs. F. E. Smallwood and C. H. Beer.

J. S. B.

* * *

ALBERTA

EDMONTON DENTAL SOCIETY.

PRESIDENT, Dr. L. V. Janes; Vice-President, Dr. Leslie McIntyre; Secretary, Dr. Alex. Gemeroy.

At the November meeting Dr. Leslie McIntyre read a paper on "The negative pressure technic of impression taking," which was kindly loaned by Dr. Stansberry, of Seattle. The discussion was opened by Dr. H. Gilchrist, of the Dental Staff of the University of Alberta.

* * *

The Lethbridge Study Club has commenced its season's work with the study of casting, each member being required to present a three-quarter crown preparation for inspection and criticism.

* * *

Dr. L. T. Allen, of Lethbridge, is the author of the following verse that appeared in a recent issue of the *Herald*:

AUTUMN.

O Autumn! glorious Autumn!
How it pains to see thee go
Can'st not stay with us a season?
Hold the coming of the snow?
Wait! the leaves are softly falling
Flaming hues of gold and brown
How they struggled in the Springtime
Bursting from each tiny bud;
How they wearied in the Summer
When the heat at noontime stood,
But to-day their work is ended
(Well they've earned their earthly rest)
And they softly whisper, passing,
"I must leave you, it is best."

J. W. C.

ORAL HEALTH

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TORONTO, NOVEMBER, 1924

No. 11

EDITORIAL

Endowments for Dentistry

AS the years go by, men of wealth, more and more, are thinking of their possessions in terms of trusteeship. Their attitude toward their wealth is not so much one of proprietorship as it is a desire to spend or bequeath the money under their control in the best interests of society as a whole. Thoughtful men are constantly observing various organizations for the purpose of learning something of the public service being rendered and of the extent and urgency of the need for financial aid.

There is an obligation resting upon every member of the dental profession to present to patients, as opportunity may offer, the pressing needs of Dentistry and her justifiable claim for inclusion, along with other health agencies, in the bequests of the wealthier of our Canadian citizens.

The Royal College of Dental Surgeons of Ontario recently announced the establishment of a trust fund of \$15,000, the interest upon which is to be used annually in the purchase of books for a dental library to be known as the Harry Abbott Memorial Library. This generous benefaction was arranged by the late Doctor Harry R. Abbott, and so far as is known, is the first bequest of an individual citizen to a Canadian Dental College.

What more worthy object exists, for public or private benefaction, than that of the Canadian Dental Research Foundation? Or, should educational activities be favored, what branch of education would be more worthy of assistance by way of endowment, than one of the Dental Faculties in Canada? Members of the dental profession are urged to keep before them the claims of Dentistry and the pressing needs of dental science, research and education, for financial aid, and, as occasion may present, urge these claims upon patients, friends and other public-spirited citizens. Dentistry is an essential factor in public health organization, and, as a branch of the great healing art, is entitled to generous benefaction from those who bequeath support to public health or other movements for the betterment of the race.

His Portrait of Himself

DEDICATED TO DR. C. N. JOHNSON.

Dr. J. Wright Beach, of Buffalo, has written the editor referring to Dr. Johnson's message to the Dental Profession, which appeared in September ORAL HEALTH, as being a classic and as having inspired the following verse. The title of Dr. Johnson's message was "Practical Fun."

MEN differ! Strange, I hear you say,
 But I'll explain it in this way:
 Once in the dim and distant past,
 A painter leapt to fame so fast
 That when he wakened in the morn
 His name forever had been born.
 A likeness he had deftly wrought,
 A soul on canvas had been caught,
 Infusing eyes and smiling face
 With living warmth and gentle grace.
 The facile lips in calm repose
 Seemed poised to catch unborn echoes,
 To hear the world acclaim "complete"
 And worship at the artist's feet.

* * *

'Tis fate that some should paint with paints
 And vitalize inanimates,
 While others draw, not knowing it,
 A thousand pictures framed in wit,
 All scribed in ink, of words simplex
 And flowing rich with human text.

I saw and read from span to span
A picture drawn by such a man,
Whose words had mirrored in each thought
The riches that his soul had bought.
I saw the glory of his face
Shine through each line, and every space
Revealed the breath of sympathy
Sent out to all humanity.
I felt the pulse of gentle heart
Throb through each word, and every part
Bespoke his love of truth and right,
Potential source of lawful might.
I heard his plea for charity
Where human faults were plain to see,
And "judge ye not" gave evidence
Of guarded speech and tolerance.
I saw outstretched his helping hand
To raise and bid the fallen stand,
And heard the words of hope and cheer
That drove despair away with fear.

* * *

This is the picture that he drew
In simple phrase, and yet he knew
Not that the portrait, done,
Revealed him in "Practical Fun."

"HABEC."

Buffalo, November 3rd, 1924.

AN IMPROVEMENT IN THE USE OF TELESCOPES IN REMOVABLE BRIDGE WORK.—In spite of a perfect adaptation, many, if not all, removable bridges are difficult to take out of the mouth, and some of our patients come back saying, "Doctor, it is very nice for you to make a fine bridge, but it is a hard task to remove it. How can I avoid that nuisance?" As such incidents are frequent, I will suggest a simple and effective means put into practice by my assistants and myself for the last year or so which has proved most satisfactory to patient and operator.

Once the bridge is completed, a piece of gold wire about three millimeters thick is soldered on the buccal surface of the telescope crown and slightly above the cervical margin perpendicular to the axis of the crown. The extremities of the wire are slightly raised and separated from the surface of the crown, rounded and carefully polished in order to avoid friction. Whether the telescopes be bicuspid or molars the removing of the device is then easy and time-saving.—*Dental Cosmos*.

ORAL HEALTH

A JOURNAL THAT STANDS FOR THE "OUNCE OF PREVENTION," AS WELL AS THE "POUND OF CURE"

Vol. 14

TORONTO, DECEMBER, 1924

No. 12

Our Dental Responsibility*

CARLETON FOX, D.D.S., DETROIT, MICH.

MR. President, Members of the Toronto Academy of Dentistry, Ladies and Gentlemen:—

The invitation which was received from your estimable president, Dr. Day, requested that my subject be similar to the symposium, which Dr. Howard Jackson, Dr. B. D. Welling, and I gave before the Ontario Society the latter part of May, this year. The time that was required to read those three papers consumed the greater part of a forenoon. To-night, however, I shall not keep you so long, but in as brief a time as possible review that clinic, adding to or taking from it, as best fit to come within the subject which I have chosen for this occasion, namely: "Our Dental Responsibility."

Within the last decade dentistry has made more progress than in any other given period of time. From the earliest Chinese and Egyptian civilization to within a very few years of the recent great conflict, which not only changed the history of the world but brought about a marked alteration in the dental profession, we had been interested in the mechanical aspect of dentistry, restoring broken down and diseased conditions of the mouth, and had paid no attention to the systemic effect these conditions might have upon a patient. The research work of several men, the most prominent of whom are, Drs. Rosenow, Hunter, Billings, Irons, Meyer, Duke, Price, and others of equal standing, is responsible for this radical change in our relationship to the laity in general and our patients in particular. The more general use of the X-ray machine and the shadows it produces on a light sensitive material when properly placed, coupled with the findings of these men, is really the reason for our having to-day a very definite

* Read before the Academy of Dentistry, Toronto.

basis from which to draw the conclusions that our practices of the past, namely, endeavoring to replace with a pink gutta percha point, or some baser material, that which the Almighty meant to be a healthy pulp, were in the big majority of cases all wrong.

For every action there is a reaction. The public press spread the news a few years ago that teeth were the cause of rheumatism. To a certain degree they were right, but in the great majority of cases they were not. The Professions of Medicine and Dentistry grasped the psychology of the mob and as a result numerable teeth were removed, relieving a few people of their rheumatics, but most of them of their natural organs of mastication, with no miraculous cure as had been expected. For a period of time every tooth that had a dark area radiographically apparent at its apex or approximating it, was condemned. We, as dentists, were not alone in this tooth slaughter. The medical profession also did its part by sending to the noose, teeth, to which the exodontist acted as executioner. Science, however, has staid our hand. Lectures and essays, given and published at our meetings and in our journals, have brought about the education of the professions at large. They have taught us the meaning of the shadows depicted in the radiograph, and also the relationship of unhealthy oral structures to the human machine.

With the responsibility of our present status in the eyes of the world, it is only fitting that we be prepared to assume the burden and give to our clientele the professional service it deserves. Therefore, when a patient consults us it is imperative that we be able to detect certain physical signs that are characteristic of serious systemic disturbances. A few minutes conversation will reveal a fund of information that usually is beneficial to the dentist, especially if there is an extensive amount of restorative work to be done.

Many diseases are apparent to the naked eye. Syphilis may be detected in several ways. First, if the hair has fallen out in patches, or if the cornea of the eye fails to react to sudden changes of light, while in the tertiary form lues is responsible for the perforation of the septum, followed by a so-called sunken or saddle nose. Hereditary luetic conditions are manifested in Hutchenson's teeth.

The eye tells a great many tales if we observe them closely. Swollen lids are suggestive of anaemia and erysipelas but also are indicative of kidney diseases. Jaundice is the easiest of all diseases to diagnose, giving its characteristic yellowish tinge to the eye and skin, while anaemia casts a bluish hue to the eye ball. A unilateral dilatation of the pupils is found in tuberculosis. The gray ring at the edge of the cornea is a sign of old age, and may also indicate arterial sclerosis or high blood pressure. If the lips are pale, an anaemic condition may be expected, while if they present a bluish tinge, heart and lung conditions are usually the causative factors. One other reason for the bluish cast to the lips is the use of aspirin in excess. If the use of

this drug is found to be the cause of this definite diagnostic sign, then it is our duty to find out why it is used in quantities sufficient to markedly change the normal picture. Upon questioning patients as to the use of this drug, they will give you many varied and peculiar answers, but nevertheless their answers may reveal very susceptible individuals and those of exceptional lowered resistance, which patients would of course be a poor dental risk. Enlarged glands of the neck may be due to an abscessed condition of the teeth. Follicular tonsilitis, tuberculosis, syphilis, malignancies and mumps also cause an adenitis of the maxillary chain, while thyroid enlargements may or may not cause bulging of the eyes.

Edema of the extremities is indicative of heart and kidney diseases, while moist hands suggest some thyroid disturbance. Clubbed fingers, though not a definite diagnostic sign, are closely affiliated with tuberculosis, chronic bronchitis and asthma, also chronic heart diseases. Arthritis, in its various forms, may be detected by deformities of the several joints, more especially of the hands and feet, and of these the distal phalanges.

Many of you are asking yourselves, "Why is he talking about all this physical diagnostic stuff?" I'll tell you why, gentlemen. We have a responsibility to live up to. It is our duty to our patients to be able to recognize abnormalities before we do that patient an injustice, by filling one tooth that might have a bearing upon the systemic condition, of which the patient may be the victim.

A few of the diseases in which the teeth play a prominent part are as follows:—Conjunctivitis, Iritis, Corneal Ulcers, some cases of Retinitis, Choroiditis, Visual Disturbances of the nervous motor mechanism of the eye, Chronic Inflammatory processes in the nose, low grade inflammatory changes of the maxillary sinuses, predisposing to Acute Sinusitis, Chronic Tonsilitis, Pharyngitis, Laryngitis and Bronchitis. Also the draining of infectious material of a lower first molar will cause an adenitis of the submaxillary and cervical glands and may cause tinitis, vertigo, sclerosis of the ossicles, chronic furunculosis of the external auditory canal, and disturbances of the pneumo-gastric nerve, with an increased cardiac inhibition, periodic loss of voice, occipital headaches, and asthmatic attacks.

From the actual absorption of pus and toxic material, teeth may cause gastric disorders, various joint disturbances, especially of the hypertrophic type and muscular inflammations and stiffness. Anemias of various types are traceable to teeth, while pelvic inflammations, intestinal and abdominal derangements, accompanied with a few cases of nephritis, are traceable to the oral cavity as a focus.

An article recently published by one of the leading drug manufacturers, who maintains one of the largest research laboratories in this country, states:—

"The train of systemic disturbances excited by the deleterious in-

fluence of micro-organisms contained in the pus of pyorrhea ranges from gastritis to actual septicaemia. A mouth containing decayed teeth is a poison laboratory which sends a host of bacteria into the alimentary tract of the patient, but when the teeth are capped and the pus can find no outlet, the bacteria are liable to cause still greater trouble. They multiply under the favorable conditions furnished by the crown and bridge work and they seek an outlet through the porous bone tissue, thus gaining access to the lymphatic system and are then carried to distant organs.

These infections are generally of long duration, their progress is slow, and the dangerous feature is that the existence of the infection is unknown to the individual and often not recognized by the dentist to whose notice it generally comes in its early stage.

Endocarditis, Arthritis, Neuritis, Periostitis, Ocular and Oral disturbances have been traced to oral foci and, in a paper by Cotton read at the meeting of the New York Psychiatric Society, it was shown that chronic, masked, or focal infections play a very important role in the etiology of mental disturbances.

Most of these conditions were cleared up when the sources of infection were eradicated, but in addition to the elimination of the oral foci, systemic treatment coupled with such remedial measures as will raise the recuperative and defensive power of the tissues should also be employed."

Added to this is the statement of Dr. W. A. Price, saying that ninety per cent. of all degenerative diseases are due to dental foci. These are the reasons, gentlemen, that I ask you to consider before you attempt to restore any missing dental organ, in the mouth of an individual that has the slightest degree of lowered vitality or resistance.

How many of you have known of patients that had Diabetes, Syphilis, Nephritis, Tuberculosis, Acute Tonsilitis, Lead poisoning, or an acute infection somewhere in the body, that did not have some dental manifestation? After a serious illness, especially influenza, how many of you have had a patient come to your office with a swollen abscessed tooth, that from the history of injury or mechanical restoration, should not be in the condition that you find it? Everyone of you have had such an experience. Therefore, if these conditions, which have just been mentioned, will cause dental disturbances, is it not logical that thirty-two organs, that are not normal, will cause the multitude of ailments that were previously mentioned?

In order that we be able to distinguish between those conditions in the mouth, that demand radical or conservative treatment, it is necessary for us to make a modern and careful survey of the mouth of a patient.

Taking it for granted that a thorough history has been taken, which includes the general history of the patient, age, sex, nationality,

family history, survey of the heart, pulse, blood temperature and hemoglobin, etc., we now begin the survey of the mouth and teeth by aural, digital and instrumental examination. The color of the membranes of the investing tissues of the teeth and mouth should be noted, which, if normal, have characteristic firmness and pinkness, while the gingivae is closely attached to the teeth. Observe any calcific deposits, disturbances of malocclusion, crowded arches, debris in the interproximate spaces, poorly adapted crowns, lack of contact points, restorations which are insanitary or ill fitting, or any irritation whatsoever.

A gentle pressure made in a circular movement, beginning over the root ends of the teeth and directed toward the crown, should, in the normal, elicit no sense of tenderness in the periosteum underlying such areas; but many chronic pericementomas which have never been in evidence may be detected, by the presence of pain, in a few seconds. Any variance from the normal is reflected in the color of the tissues, and the greater the bacterial invasion, the greater the flow of pus under the above mentioned digital pressure.

One should note the quantity of the saliva, whether of heavy consistency, or limpid, and the amount of putrefactive bacteria on the tongue. If we find calcific deposits or erosion in the region of Stenson's duct—what is the cause? The parotid gland is governed by the thyroid and para-thyroid glands, and the sub-lingual and sub-maxillary glands are governed by the adrenal and pituitary glands. Therefore, if we find erosion or calcific deposits in this region, we know the cause is from the thyroid or para-thyroid glands. If in the region of Wharton's duct, the adrenal or pituitary glands are at fault. As for treatment we can do nothing ourselves, because it is systemic, and should be in the Physician's hands. If we will refer our patient to a competent physician with our findings, and the reasons therefore, we will gain the confidence of the patient as well as the physician.

The tonsils should be examined by placing a mouth mirror between the pillars and below the tonsils. Then with the index finger above the tonsil, apply a gentle pressure, and much to one's surprise quite often pus may be detected in a seemingly good tonsil. Why do we make this examination? Because on account of anatomical association, pus present in the tonsils frequently involves the third molar in inflammation of both acute and chronic natures. Here is another place dentistry and medicine overlap.

Besides the examination of individual teeth by means of exploration and percussion, the tests by the use of the electric pulp tester, transillumination, and thermal stimulation, have been found to aid us materially.

Where we have irregularity of teeth, we most often find a high palate, and in such cases one should remember that they are commonly associated with deflections of the nasal septum, contracted nares,

spurs, and attendant chronic atrophy, hypertrophic internasal conditions, the invariable results of which are pathological affections of the nasal accessory sinuses. Such individuals are subject to mastoiditis and middle ear diseases.

Protrusion of the tongue should show by its extent or deflection from one side to another, the presence or absence of nervous conditions which might affect the nervous control.

We must be able to recognize the early manifestations of precancerous conditions, as delay in treatment may be fatal.

Epulis is a commonly used but confused term, employed to distinguish growths which usually originate in the periosteum between or around the necks of teeth or sockets. Such a growth may be a papilloma, fibroma, sarcoma, or any of the tumors which might spring from the fibrous tissue of the gums and periosteum, but it is generally used to describe a certain giant cell sarcoma. The mushroom like growths are benign at the beginning, but sooner or later become malignant through having been irritated by biting or by the application of iodine or other caustics. They are usually found in the anterior portion of the mouth.

Ulcers of the lip may be due to Syphilis, tuberculosis, septic infection or injury. If an ulcer is allowed to become chronic an innocent sore may become malignant. In elderly people the continued irritation of jagged teeth, and the constant use of a pipe predisposes to a cancerous growth known as epithelioma, which differs from chancre by the length of history, the dry quiet appearance, absence of sore throat, secondary eruptions and of large submaxillary buboes.

According to Butlin the five most characteristic and important of precancerous or early cancerous lesions are: (1) a little plaque-like hard area, smooth and polished, but neither ulcerated nor excoriated; (2) the transformation or replacement of a simple ulcer by a cancerous ulcer, which only differs from the simple ulcer by feeling a little stiffer and a very little firmer; (3) the transformation of an entire plaque of leucoplakia tongue into cancer, only marked at first by very slight and superficial hardening; (4) a white, warty growth or a compound wart, neither broken nor ulcerated, and feeling at first as if it were fixed to the mucous membrane and quite superficial.

Carefully examine the tongue to disclose evidence of chronic ulceration, character of its surface, whether clean or coated, deeply fissured or affected by leucoplakia.

Leucoplakia: This is a term to describe an opaque dead white or slightly bluish or yellowish patch, often multiple patches coalescing to form a single area. It is the most frequent forerunner of cancer of the tongue. It generally appears at the tip or border of the tongue or Buccal fold. It is frequently thickened at the center, and often feels harder and drier than the surrounding normal mucosa, both to

the patient and operator. Later, it may become more firm and perhaps fissured, the white covering being cast off in places, leaving patches of red, raw tissue. Warts and fibromas on the tongue may after a time of innocences take on malignant growth. (Waldron.)

Leucoplakia should not, as long as there is no cracking or peeling off or formation of ulcer, receive active local treatment other than the use of radium. The removal of the cause, tobacco, irritation, or treatment of existing syphilis usually suffices. (Waldron).

Periodontoclasia: Fully 90 per cent. of all persons are affected with this disease; therefore, it behooves us to take note seriously of any gingivitis or inflammation at the gum margin which may in time extend to the pericementum of the root, and in all cases in question pressure about the necks of teeth should be made to disclose evidence of pus in any quantity.

Trench Mouth: This disease is confused with pyorrhea alveolaris and is known as Vincent's Disease, a fusospirochetal infection of the mouth. The tonsils may be affected, from which a yellow sloughing ulcer may spread to the soft palate and other parts of the mouth. A second form affects, more particularly, the gums and closely resembles the most severe type of periodontoclasia. Still another type causes a general inflammation and is not infrequently fatal in its effect. Special attention should be given to this disease, as the infection may travel the entire course of the alimentary canal, forming ulcers as it progresses. Diagnosis is made by microscopic examination.

Stomatitis is an inflammation of the mucous membrane of the mouth, and is classified as follows:

Local acute stomatitis:—

- (a) Catarrhal.
- (b) Ulcerative.
 - 1. Canker sores.
 - 2. Alveolar ulcerations.
- (c) Herpetic.
- (d) Mycotic (Thrush).
- (e) Gangrenous.

Symptomatic Mouth lesions:—

- (A) Acute constitutional diseases.
 - 1. Measles.
 - 2. Diphtheria.
 - 3. Scarlatina.
 - 4. Typhoid.
- (B) Chronic Constitutional Diseases.
 - 1. Tuberculosis.
 - 2. Syphilis.
 - a. Chancre.
 - b. Patches.

c. Gumma.

d. Ulcerative gingivitis.

(C) Drugs.

1. Mercury.

2. Lead.

3. Iodides.

4. Oleocarpaine.

5. Iodine.

We can readily see that this definition covers a multitude of sins and has in its classification several of our specific diseases. Therefore it is more than important in our diagnosis.

Cysts are not an uncommon sight in the dental office and should receive our close attention when making our survey of the mouth. The most common of these is the retention cyst caused by the obstruction of a duct of any of the glands of the oral cavity.

Time will not permit an extensive outline of radiographic technic. We would advise, however, that radiograms be clear reproductions of the areas contained therein, with no distortion as to the length or breadth, so that a correct interpretation can be made.

Some of the ill-informed members of our profession still maintain that only minor importance should be attached to the findings of the radiogram, their claim being that such images can be construed as showing conditions which do not actually exist.

Such an attitude as this can be explained as being the result of lack of knowledge of the fundamental principles of radiography and especially of the science of interpretation.

The idea is prevalent also among these men, and more decidedly among medical men of the same type, that the interpretation of a dental radiogram is an extremely simple matter, requiring little, if any, preparation, on the part of the one who is to make the interpretation. This erroneous idea has led many incapable persons to attempt to interpret radiograms, with the resulting condemnation and slaughter of many healthy teeth.

The first essential of interpretation is an accurate knowledge of the anatomy and physiology of the parts under consideration, as a radiogram is a shadow picture, and a shadow picture is meaningless unless one is thoroughly familiar with the main characteristics of the original. In addition to mere outlines shown in a shadow picture, the radiogram shows varying densities due to the fact that the roentgen ray penetrates all matter in inverse ratio to its mass of density. These varying densities are often misinterpreted and therefore it is well we have them fixed in our mind, so as to recognize them when a diagnosis is to be made. The shadows vary with different individuals and also with the varying angles of radiation.

If you will keep the following in mind and adhere to it closely

in the interpretation of the radiogram, you will find it a great help.

Maxilla:

1. Light areas.
 - a. Zygomatic arch.
 - b. Border of tuberosity.
 - c. Floor of antrum.
 1. Accessory antral cells.
 - d. Septum of the nose.
 1. Sometimes the cartilage of the alar.
 - e. Lamina dura or alveolar border around teeth.
 - f. Teeth.
2. Dark areas.
 - a. Anterior palatine foramen.
 - b. Malis of the nose.
 - c. Canine fossa.
 - d. Infraorbital foramen.
 - e. Postpalatine foramen.
 - f. Maxillary sinus.
 - g. Pericemental membrane.

Mandible:

1. Light areas.
 - a. Lower border of bone.
 - b. External oblique line.
 - c. Myol-hyoid ridge.
 - d. Symphysis.
 - e. Mental spines or Genio-hyoid tubercles.
 - f. Mental eminence.
 - g. Lamina dura.
 - h. Teeth.
2. Dark Areas.
 - a. Mental foramen.
 - b. Mandibular canal.
 - c. Pericemental membrane.
 - d. Lack of cancellations in 15 per cent. of cases.

After gaining an accurate knowledge of the anatomy and physiology of the parts, the next step is to become familiar with their radiographic appearance under normal conditions, for unless one is familiar with the normal it is obviously impossible to recognize pathological or abnormal conditions unless they are of glaring nature. By normal appearance, we mean normal in all respects—free—not only from the previously mentioned conditions, but also from technical errors, the chief of which is distortion. To avoid this mistake we must adhere most religiously to a technique which results in the shadows of the structures under scrutiny being imposed upon the film in their correct proportions.

In addition to these requisites, one attempting to interpret radiograms correctly, must understand enough of the fundamental rules of the technique involved in its making, to know whether or not the method used was correct or faulty, and if faulty, whether the degree of error was sufficient to render it useless.

In radiograms correctly made the structures under normal conditions have a characteristic appearance due to the varying densities of the contained structures. For this reason metallic objects such as gold crowns and fillings appear in white masses, and root fillings as somewhat less dense white line. The enamel and dentine are next in density, while root canals show plainly as dark channels in the dentine. The Alveolar process and maxillae show their fine, uniform cancellous structures in varying degrees of density, depending upon their thickness.

Since the radiogram is transparent proper illumination is of the utmost importance. This precaution will permit a careful study under light conditions which favor a maximum detail.

Normal alveolar process when correctly radiographed has a distinct appearance owing to its anatomical structure and chemical composition. There is an irregularity of cancellations and a harmonious blending of lights and darks in the picture. The irregularity of cancellation is due to the fact that the spaces which constitute spongy bone are irregular in shape and size, for spongy bone is made up of lamellas, which instead of being laid down in the orderly manner as in compact bone, are arranged in a disorderly way. These groups of lamellae form strands of bone tissue which unite, and in uniting form cavities of irregular shapes. For this reason a picture of spongy bone, when normal, shows white lines composed of thin, delicate strands of bone tissue enclosing dark areas, no two of which are exactly alike. Therefore the picture presented by normal alveolar bone is one of irregularly shaped minute cavities surrounded by fine, delicate strands of bone structure.

When bone is subjected to injurious influences, the cancellations lose their clear cut borders and become smaller and close together. Therefore, whenever cancellated structure tends to become regular, ill-deformed and homogeneous, the suspicion of pathological process is entirely justified.

As the presence of calcium salts in the bone tends to obstruct the passage of rays, an increase or decrease of this factor will be apparent in the radiogram. If an increase is present, we have a greater density with a resulting lighter area, termed radio opaque area. If the reverse is true we have less density with the dark area called radio-lucent.

In the study of radiograms, therefore, a definite effort should be made to determine whether or not a change from the normal has occurred. If we find that there has been a change, we must then at-

tempt to ascertain the cause of it. In numerous instances the cause may be apparent in the radiogram, but in far more the cause is subject to question. This fact definitely establishes the necessity of recording clinical findings, such as history, conditions of dentition and occlusion, as well as the physical state of the soft tissue of the mouth.

In judging the relationship of individual teeth to any suspected condition, two structures having a characteristic radiographic appearance must be carefully scrutinized. These are the peridental membrane, visible as a fine, even close fitting black (radiolescent) line, and immediately exterior to this, the peridental lamellae, showing as a similar, even white (radiopaque) line. About a healthy tooth, these two structures show no variation of thickness or contour.

If a pathological process has its origin within a tooth, the first structure to be subjected to its influence is the peridental membrane. This is indicated by a thickening of fine, even, black line at the point of irritation. As the membrane is closely encased in the lamella, its thickening or hypertrophy pushes out the peridental lamella, causing it to sag or lose the normal contour at the seat of the inflammatory process. If this inflammatory process remains unchecked and continues to progress the hypertrophy of the peridental membrane continues with resulting encroachment upon the alveolar bone structures. With the changes in nutrition which accompany progressive inflammatory processes, there is a resultant decrease of the calcium salt in the adjacent alveolar bone as well as the diminution of the bone lamellae, all of which tends to lessen the resistance usually offered by these structures to the passage of rays. For this reason the area is rendered more radiolucent than is characteristic of normal structure.

Here we must remember that infection is not necessarily the cause of such tissue change. Irritants such as chemical, mechanical, thermal, electrical, may produce conditions similar in appearance. Clinical facts again must be carefully reviewed.

Cysts and tumors of the maxillae, owing to the character of the tissue changes which take place in their development, are visible as radiolucent areas. Due to lack of nutrition they are radiographically demonstrated as translucent areas.

Necrosis, Rarefying Osteitis or Caries within the alveolar bone or supporting structure are manifest in the radiogram also as radiolucent areas. They differ in appearance from cysts and pericementomae in that there is a less sharp line of demarcation between the radiolucent and the surrounding tissue.

Another type of radiographic variation is increased radiopacity. This reaction may be defensive in character, resulting from an increase in the number of bone cells. This increased deposition of lamellae may render the bone in the affected area very dense and compact in character.

This condition, which is doubtless due to a morbid increase of

nutrition, may, as in the case of progressive inflammations, be due to infection or any of the other irritants mentioned.

Radiograms of edentulous areas are advisable because either of the radiographic variations, progressive or defensive, may be encountered in the alveolar bone after all the teeth previously held there had been the seat of an infection process. If upon the removal of such teeth the infected area is not eliminated, either through natural means or curettement the condition may persist, and if so, it may be shown by properly made radiograms.

We must safeguard the trust placed in us by the patient. If a healthy tooth is condemned through our inability to make a correct diagnosis, we are robbing the patient of a part of his masticatory apparatus.

On the other hand, if pathology is retained through faulty interpretation, we are then subjecting the patient's health to the gravest of dangers, namely, auto-intoxication from focal infection. The blood passing a given point several times per minute may cause a generalization of this toxin.

Therefore in seeking out the various abnormal and pathologic conditions to which teeth and the adjacent tissues are subject, we should not be misled by indefinite shadows in radiograms. Only those made in accordance with a definite and exacting technique should be considered as diagnostic aids. If a doubt exists, do not hesitate to make another or several exposures if necessary, thus assuring yourself that any conclusion reached will be founded upon exact facts.

Thus far we have endeavored to bring before you the responsibility that is placed upon us pertaining to teeth as foci of infection. In a brief way, physical, oral and radiographic diagnosis has been reviewed, stressing the relationship of oral infections to systemic disease; and in turn systemic disease to oral infection. We have mentioned the importance of early diagnosis of oral abnormalities, and the essential points of radiographic interpretation. In closing we will review a few case histories that have a direct bearing on the subjects we have covered.

The following cases are classified in the same order we classify diseases in which teeth play a prominent part, first, anatomical association; second, nerve reflex; third, toxic or bacterial absorption.

A man twenty-four years of age. The removal of two lower third molars relieved him of the malady of which he was suffering in a little more than two weeks' time after the operation. The history of this case was really interesting. He had been afflicted with epileptic spasms which started when he was nineteen years of age, and his parents noticed that every spasm occurred immediately after he had had his breakfast. For a while this young man did not partake of his usual morning repast and progressed for a few days without his so-called fit. The spasms then came after he had his luncheon. This condition lasted for a few days, and his advisors decided that he should have no luncheon, and as

before he was relieved of his epileptic contractions, but being a normal young man as far as food is concerned, and deprived of two meals a day, he craved nourishment. However, as soon as he did satisfy his hunger the old ailment returned. I do not know, neither did his physician, what effect eating had to do with these spasms, and because of that fact a psychiatrist was consulted, and he advised rays to determine whether or not there was any change in the Cella Tercia of any great importance. I do not know what the roentgenologist's report of the Cella was, but the rays revealed two lower impact third molars accompanied with considerable pressure atrophy at the apex of each respective tooth. These teeth were surgically removed, and with the exception of three recurrent attacks which occurred during the convalescence, this man has been relieved for over a period of seven years.

A case of neuritis which we attribute to and classify under anatomical association was due to pus which was walled off in this third molar area.

The clinical findings showed the gingivae to be normal and no pus was expressible upon digital pressure. An explorer was forced between the margin of the gum at the distal end of this third molar and the pus fairly oozed out. The tooth was removed, followed by the first night's sleep this man had had in six weeks without the aid of some narcotic. He gave the history of normal tonsils, but after the tooth was removed pus was expressible from them. Ten days later the tonsils were removed and a follicular abscess was found in the anterior wall of the fossa. He made an uneventful recovery with no recurrence of his neuritis.

Another case where radiography and correct interpretation proved its worth accompanied that of a young lady twenty-three years of age, who had suffered from a facial paralysis over a period of nine months. Not the type of Bell's Palsy that comes on immediately, but in this particular case it became worse and worse. This young lady travelled from one part of the country to the other, visiting one of the internationally known clinics and consulted several physicians and surgeons in many of our larger cities. Reluctantly she came to one of her old class mates at school and asked him for his advice. She was requested to return the next day with all the radiographs she had had taken of her mouth. She did this, but nothing of interest presented itself. After examination other rays were taken of the left side of her mouth and they revealed two partially unerupted and impacted third molars of the upper and lower jaws respectively. They were surgically removed and within six hours after the operation, which was on Tuesday, she regained the use of the muscles of her eye, and by Thursday of the same week the muscles of her face had regained their normal functions.

A young lady at the time the following radiograms were made, was an inmate at a sanitarium for mental diseases and under the care of an eminent psychiatrist. She had endeavored to commit suicide twice in her short life, being at the time these rays were taken only seventeen years of age. Every possible effort had been made to relieve her of this malady, and finally an X-ray examination was advised.

The two impacted cuspids as shown were removed. She left the sanitarium two weeks later, is home, has no nurse, which she had had constantly day and night for a period of two years, and is to-day pronounced well and normal mentally.

One of the most interesting cases of neural disturbance is manifested in the history of a young lady. When she was fifteen years of age she began to have severe migraine headaches, which involved the parietal and occipital regions of her head. Having had a few attacks of acute indigestion, she was advised to have her appendix removed. This was done, relieving her of her indigestion, but the headaches still persisted. At sixteen she was relieved of her tonsils, thinking they might be the cause of some toxine absorption, but this did not relieve her of her complaint. By this time the pain was so severe she was unable to walk, the jarring of the most careful footstep causing most severe pain. The

next attempt at relief was entering the hospital of one of our state universities, for observation. After the usual laboratory tests, X-ray and physical examination, a small cyst was found in the submaxillary region, which was removed. This gave her no relief, and she was at the time of the above operation eighteen years old.

After this experience consultation with several men advised operation for so-called female trouble. This was not done, purely on the advice of one of our most renowned surgeons.

At twenty she entered one of the best known hospitals in our city for another physical examination, and at the end of two weeks left the hospital no better than she had been before her admittance.

Throughout the five years of these excruciating headaches she lost very little weight, her appetite being good and her nights restful.

She was twenty-two when her teeth were radiographed by a dentist, and this impaction as shown found. The tooth was removed under nitrous-oxide and oxygen anaesthesia, to which her reaction was very bad. The operation was finished, using a percentage of sixty-five of oxygen to thirty-five of nitrous-oxide. Due to her weakened condition and the severity of the pain, she was admitted to the hospital and kept under close observation during her postoperative treatment. She remained two weeks and then returned to her home; gradually her headache left and she made an uneventful recovery. The tooth was removed in July, 1922.

This slide is of a boy of whom I have no history or data of any sort; in fact I have forgotten his name. His dentist referred the boy for the removal of these two supernumerary teeth. Talking with the mother after the teeth were removed revealed the fact that he had had Saint Vitus dance or chorea off and on for some years.

I remarked at the time that these teeth might have had something to do with this ailment through nervous reflex. I had forgotten about the boy, when several weeks later I was called to the telephone and the mother said her son had had no attack since the removal of these teeth.

The remaining cases are of the type that come under the heading of bacterial or toxin absorption. We have chosen only a few showing the effect of absorption on the remote and vital parts of the human machine.

From the radiograph as shown this condition does not look at all serious. It is one of the several rays made of a woman 45 years of age, and who has been suffering from arthritis for a period of some seven or eight years. Her physician had tried all means within his power to relieve her, and being a woman of wealth she could co-operate with him in every respect, by going South in the winter and taking various and sundry baths. She would get relief for a time but always had a severe recurrence just when she thought she had recovered, and each time would be set back to the place from which she started years before. For some reason or other she put herself in the hands of a young physician, and he in turn referred her for consultation.

The usual clinical examination was made, which revealed a healthy, normal mouth, there being no crowns or bridges, and apparently no devitalized tooth. She had lost when a child one first molar, her third molars had been removed, and one lower second molar. The gums were healthy and pink. This second molar had been removed about two years before she noticed her first attack of rheumatism.

The root fragment, as shown on the slide, was removed and the entire area curetted, the field was washed, packed, and the patient sent home. That night she had a severe reaction, which necessitated consultation with her physician.

The wound was treated every day for some time; she gradually improved, and is to-day well and has been without any recurrence of her former trouble in a period of nearly three years.

We have on record several such cases, where the removal of dental foci has relieved the patient of their arthritis, but as yet we have never

had anyone throw away their crutches immediately after the causative factor had been removed.

Where general systemic involvements are manifested because of oral disturbances cannot be better shown than in the case of a boy, ten years of age. He gave a history of anuria (inability to retain urine), and in the middle of December while in school he was taken with a sudden chill followed by a fever. The throat and tonsils were inflamed and were treated with no results. The temperature continued and the child became weaker and weaker, being confined to bed, he had to be assisted in every move. The laboratory tests showed pyuria (pus in the urine). The child was carried to the office and rays were taken.

These teeth were carefully removed the same day, which was on January 6, 1922. Within a few hours the temperature subsided and in three days the anuria disappeared and the child made an uneventful recovery.

These are rays taken of a man with a double iritis, which was complicated with neuritis of the right leg and foot. The condition had been of some years' standing and might be termed a chronic case. The neuritis was so severe that for years this gentleman had been obliged to supply himself with shoes and braces made especially to accommodate the deformity. After the extraction and currettement of the area shown his iritis gradually left him, and in a few months he was able to buy shoes like you and me, providing he had the money to do it.

Perhaps one of the most interesting cases from the standpoint of bacterial or toxin absorption is that of an ex-service man who was confined to the hospital because of sugar diabetes. It was absolutely impossible to keep the man sugar free except by starvation diet. After the usual tests and laboratory findings, and from previous history, it was found that he had had no ailment of any kind which predisposed to his confinement in the hospital. The only thing that revealed any light on the subject was the fact that he had had one year previous an upper left first molar removed with difficulty. This area was rayed on suspicion and the root fragment found.

This was removed, and two weeks later he was sugar free. Six months later he returned to the hospital with his former complaint. The tonsils were removed on suspicion, some two and a half years ago, and since their removal he has been eating candy with immunity.

A nurse who while in training contracted influenza. A cardiac lesion developed which left her in a weakened condition and greatly underweight. This was in the Fall of 1920. In the Fall of 1921 she graduated from the training school, and in the Spring of 1922 her cardiac inefficiency was so aggravated that she was not expected to live. Her physician advised that rays of her teeth be made, and the condition as shown was corrected by surgical interference and radical currettement of the several areas shown.

I should mention that these teeth were not corrected at the same time, but that their removal was carried over a period of one month, extracting one tooth at a time. She made a slow recovery and for the past month has been doing twenty-hour duty with no ill effects.

In conclusion, the modern dentist is not only responsible for the oral health of a patient, but to a large degree has the great burden of that patient's general health. If we endanger a susceptible individual by the use of extensive root canal therapy, fail in our diagnosis of some mouth lesion, or far greater, misinterpret a radiograph, we are not living up to the responsibility the public and our colleagues of the medical profession are placing in us. We must not only be dental surgeons but dental physicians as well.

The British Army Dental Corps

BY GEORGE CECIL, *Paris, France.*

THE British Army having been in an organized state ever since the time of Queen Elizabeth, successive military authorities had ample time in which to realize that the soldiers' teeth needed care. Yet decade followed decade without any attempt being made to provide officers and other ranks with dental treatment. A diligent search of the records yields no proof that the village barber (who, it will be remembered, was the pioneer of the profession,) held the appointment of dentist to the forces, though the blacksmith is mentioned. . . . "Sir," quoth a Cromwellian General to the stern Commander-in-Chief, "to-day I am not fit to lead the troops to victory, for I have the toothache in a most distracting form." . . . "Get thee, sirrah, to a blacksmith," was the rough Cromwell's brutal order, "and bid the fellow operate with his pincers." Nor were the services of "Kind Heart the Tooth Drawer" (an Elizabethan product) indented upon. "Kind Heart," whose professional motto was "Touch and go," plied a (literally) vigorous trade amongst the civilian element; but the War Office of the period would have none of him. Meanwhile the warriors suffered.

Marlborough, Clive and Wellington, considered military dentists unnecessary; and the Crimean War, the Indian Mutiny, and the Zulu and Egyptian campaigns, took place without the soldiers' teeth being looked after. In the Boer War, however, a performer from Kilkenny exhibited a fiendish delight in extracting. . . . "Into the chair wid ye, me man," he would gleefully bellow. "Sure, the dhrawin' av yer stumps will give me a foine appetoite for me breakfast!"

Then came the recent hostilities, when a temporary corps of duly qualified dental surgeons earned the gratitude of countless patients. They ranked as Captains or Lieutenants, according to their luck, often being mentioned in despatches. Some, though denied promotion, were awarded the O. B. E. Others escaped it.

"TEMPORARIES."

The War Office, delighted with the success of an arrangement which robbed the late war of certain horrors, recently has invited dentists to enrol themselves as dental officers for twelve months—and more. A corps of regular officers also has been formed, various inducements, including a uniform and (should the rank justify the dashing embellishment,) spurs, being offered. A mess kit also is suggested, a tasteful affair in which the colors are judiciously blended. Promotion, too, is made possible.

So much for the ornate; now for the practical. The temporary officers are engaged "for twelve calendar months, or till their services are no longer required." That is to say, if the dental surgeon is a success, the War Office may keep him till the crack of doom. Should he, while serving, be offered a lucrative partnership, the offer must be declined, for the Government has the first call on his services. Only by resorting to extremities can the wearer of the King's uniform get back to civil life and affluence; a court-martial, for example, may result in the accused being relieved of his commission. "His Majesty," states the *Gazette*, "no longer has any need of his services." The ex-temporary officer is then free to return from whence he came. Disobeying, or refusing to obey an order, amounts to a court-martial offence. The dentist, though performing his duty satisfactorily, may fail to please those who are above him—and be removed. He then sacrifices pay at the rate of £365 a year, plus free lodging, rations, (or an allowance "when rations are not issued in kind,") travelling and servant allowances, extra duty pay if sent on inspection duty, and a special grant of £50 a year when serving abroad. His khaki uniform, Sam Browne belt, and other accessories, are paid for by the War Office.

A few of these "temporaries" are fortunate. A skilful piece of bridgework, a "life-like" plate, or even a painless extraction performed upon a nervous Field Marshal, and the dental surgeon is well thought of. He will not have long to wait for promotion.

"REGULARS."

The scale of pay offered to regular officers of the Army Dental Corps is worth the attention of those who have not made a success of private practice. To an assistant who sees no prospect of ever being anything but an assistant, the emoluments of the post are worth consideration. The young man who wishes to see the world, also, may gratify his ambition, since he is called upon to serve in torrid India, icy Scotland, muggy Burma, perfumed Ceylon, equatorial Mauritius, rocky Gibraltar, dusty Malta, sun-baked South Africa, unattractive Mesopotamia, turbulent Afghanistan, and Egypt—the land of the excellent cigarette. In short, he improves his mind at the expense of the Government.

An age limit has been imposed; no candidate over forty will be accepted, and the dental officer is compulsorily retired on attaining his fifty-fifth birthday. Each year of service yields a pension of £15. Thus, after twenty years of Army dental duty, £300 per annum is the reward. Those who wish to effect an early retreat are entitled to the following gratuities: £1,000 after eight and a half years' service; £1,800 after fifteen years; and £2,500 after eighteen years. The difference between the fifteen years' and the eighteen

years' gratuity is striking, and, to secure the boon, there is no great hardship involved in serving the additional time. Nor is £1,000 after eight and a half years' service to be sneered at.

The gratuity naturally takes the place of a pension. But the ex-dental officer with only £1,000 to his credit may purchase a share in a sound practice, or he may set up on his own account.

FROM £508 TO £1,170 A YEAR.

The pay and allowances of the regular dental officer vary from £508 to £1,170 a year—with certain restrictions. The War Office, for instance, will not grant commissions to dentists who have served in the late war unless they are prepared to refund a proportion of their hard-earned gratuity. The War Office will, however, grade as Captain any dental officer who has served for three and a half years as a "temporary." Those who join with the rank of Lieutenant are promoted after a corresponding period.

The qualifications for admittance to the Army Dental Corps are simple. The Lieutenant-Colonel-in-the-making merely has to state that he is "qualified to practise dental surgery," and he must mention the date of passing his first, second and final examination, as well as any degrees that he may have taken. While in the Army the Lieutenants, Captains, Majors and Lieutenant-Colonels, have ample opportunity of increasing their knowledge. Many a soldier's mouth has been neglected, and in war time face wounds lead to intricate and delicate operations. Indeed, during the late hostilities, most admirable work was done by the temporary dental officers. Some, in fact, were the flower of the profession.

One dentist, who served on the Franco-Belgian frontier, was so skilled in injecting a local anesthetic that he invariably offered to bet doubting patients that not even the slightest twinge would be felt. A General wagered him an O. B. E. to a whiskey-and-soda that the injection would not take effect. The dentist was duly decorated! . . .

Christmas Greetings From President of Canadian Dental Association

DR. GEORGE KERR THOMSON, President of the Canadian Dental Association, and Mrs. Thomson extend Christmas Greetings to members of the Canadian Dental Profession and their families with a hearty invitation to visit Halifax, N.S., during the summer of 1926 on the occasion of the next biennial meeting of the Association.

A Symposium on the Subject, The Personal Health of the Dentist*

* * * *

High Blood Pressure From the Personal Standpoint

BY HENRY ALLEN HIGLEY, M.D., BROOKLYN, N.Y.

I SHALL talk a few minutes to-night about high blood pressure from the personal standpoint. That is, from your and my standpoint. What is there which is practical that you and I may get out of it?

In doing this I shall not consider that class of cases of high blood pressure, for which nothing can be done. Such cases are of no practical interest to you and me. But I shall take up and explain that large class of cases for which a great deal, if indeed not everything can be done.

About one year ago, in an address which I gave before the Medical Society of Ridgewood, New Jersey, I made the statement, based on an experience of five years, and comprising the study of about five hundred cases, that in about 70 per cent. of all cases of high blood pressure, which occur in people of middle life or under, the blood pressure could be put at the desired point and there maintained.

HIGH BLOOD PRESSURE DUE TO THE KIDNEYS.

This class of cases comprises those cases of high blood pressure which are due to functional inactivity of the kidneys, and form by far the largest number of all high blood pressure cases.

In these cases, the high blood pressure is due to increased amounts in the blood of certain substances, which increased amounts are due to a reduced ability of the kidneys to transmit them in the normal manner.

These substances are uric acid, urea, creatinine, chlorids, sugar and water. The high blood pressure may be due to the reduced functional activity of the kidney for any of these substances, or any two or more of them in any combination that can be made.

Each individual case of high blood pressure is hence a law unto itself, one case being due to the retention in the blood of one of the substances; another case to the blood retention of another of the substances; still another case to the blood retention of two or more of the substances, and so on. The proposition, therefore, in each individual case is to ascertain what is the special form of reduced functional

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kidney activity in that particular case. When this is rectified the blood pressure will fall.

METHODS OF STUDYING ACTION OF THE KIDNEYS.

Our methods of studying the functional activity of the kidneys have undergone a marked transformation in the last 25 years, and I may say, indeed, within the last seven or eight years. Originally the study was done entirely by a chemical examination of the urine. This method has for a long time been considered as inefficient and often delusionary. With the advent, about ten years ago, of practical methods of chemical blood examination, a great advance was made in functional kidney study. Still later, about six or seven years ago, a further advance was made in the study, by a combined chemical examination of both blood and urine. This is the most advanced method and the one which has been exclusively used in my studies.

The detail of the examination in each case is to make a chemical blood and urine examination, and to ascertain in just what respects the kidney is functionally inactive.

Practically all of the chemical substances mentioned above in the blood, are due, in greater or less degree, to the kind of food eaten.

It would, therefore, seem logical, in the treatment of this class of high blood pressure cases, to restrict or cut off altogether that variety of food which goes to make up the substance, or substances, for which the kidney is functionally defective, in any given case, and in this way to reduce the work of the kidney in the special respect in which the kidney is functionally defective.

IMPORTANCE OF DIET.

It thus comes about that the diet for every case is peculiar to and special for that case. That which would be a suitable diet for one case, would be totally unsuitable for another case. No opinion as to what diet might be suitable for a case can be given, without a preliminary chemical blood and urine examination.

In simple words, what is done in every case—is to rest the kidneys in that case, in those respects in which, in that particular case, it needs resting.

Now when this is done, experience extending over five years and in treating about five hundred cases, shows that in about 70 per cent. of all high blood pressure cases, the blood pressure can be put at the desired point and there maintained.

Having reduced the blood pressure to the desired point, by the dietary restrictions, the question that is of supreme importance to the patient is—"How long must these restrictions be continued?"

As would be surmised, such a period varies in each individual. The more pronounced the reduced kidney functional activity, the longer must the restrictions be continued. In the average case, after

a month or two, the dietary restrictions are somewhat lifted, and over a period of several months, it is possible to put the diet back to a point where it is in no way a hardship.

What is being done for each individual case is to instruct the patient as to how she, or he, must live from a dietary standpoint, so that the blood pressure may remain at the desired point.

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Diseases of the Nervous System

BY SYLVESTER R. LEAHY, M.D., BROOKLYN, N.Y.

GENERAL CONSIDERATIONS.

A NERVOUS breakdown may mean either a very mild or a very severe nervous or mental condition. For that reason, it is well to know some of the causes, and some of the symptoms of nervous conditions in general. Most people think that nervous conditions develop gradually. We are all inclined to picture a nervous person as being wildly excited; but many of the most serious forms of nervous conditions are characterized by a quiet, depressed attitude. It is estimated that there are over forty thousand (40,000) patients in the state hospitals for the insane of New York State. The annual admission rate to these hospitals is about ten thousand (10,000). Many of these conditions might have been prevented if taken in time, and if certain facts had been known regarding these conditions.

The public at large are inclined to regard nervous conditions and particularly insanity, as incurable, but the facts are, that nearly one-fourth of the patients admitted to the State Hospitals are discharged as cured. Of this number, over 30 per cent. recover within a year after admission. Besides the recovered cases, there are many discharged who, though not cured, are sufficiently well to get along at home.

Many of the causes of nervous conditions are preventable, particularly alcoholic, syphilitic, and physical diseases. In many of the types of mental disease, the cause is not clear, but economic conditions and situations causing worry are very important factors in these cases. Insanity itself is not directly transmitted, but people may be predisposed to it and a breakdown may be avoided by keeping away from unhealthy modes of life.

PARESIS.

One of the most generally known types of insanity is paresis, a serious brain disease which leads to mental and physical deteriora-

tion and death within a few years. Twenty per cent. of the male admissions to the State Hospitals are of this type.

This condition is caused by syphilis, a germ and blood disease, usually acquired through immoral habits, though it may be innocently contracted. Paresis comes on usually about ten or twenty years after the syphilis has been acquired, and very often the person has no knowledge that he ever had syphilis, because, in these cases, as a rule, the early symptoms are very mild. It is therefore important that those persons who have contracted syphilis should receive early and intensive treatment, and should have Wasserman reactions done on their blood for at least three years after all treatment has stopped. Very often, a person contracting gonorrhoea will also contract syphilis at the same time, and this is not thought of; as a result, treatment for the syphilis is not instituted.

ALCOHOL.

Another important cause for mental disease is the habitual use of alcohol, which may be brought on by the constant use of even moderate amounts, oftentimes not even sufficient to produce intoxication. The effect of alcohol on the brain, and nerve tissue, is such that it not only produces alcoholic insanity, but helps to bring about a number of mental conditions not directly due to the alcohol itself. There is no question but that the constant use of it reduces the efficiency and general health of the individual. The effect of the alcohol on children born to parents addicted to its use is also noticeable. Other drugs, such as morphine and cocaine, which are frequently used with alcohol, also produce mental conditions.

CAUSES OF MENTAL DERANGEMENT.

Some nervous breakdowns may come as a result of physical disorders. Typhoid fever, sleeping sickness, and influenza, may so weaken the system through the poisons generated, that the proper working of the various organs, including the brain, is interfered with.

Diseases of the arteries, heart, and kidneys, also produce mental conditions, and these conditions require very careful nursing and treatment.

Overwork is often spoken of as a cause of insanity, but I have yet to see a case produced by this cause alone. What usually happens is that the individual is overdoing in general, not only working long hours but eating and sleeping irregularly and neglecting his physical condition, so that sooner or later a nervous breakdown occurs.

Mental causes are very important in the consideration of nervous diseases. A healthy mind is one of the most important things in life. This does not depend entirely upon one's condition or station in life, because wealth does not always bring satisfaction, and we meet

people leading a hand to mouth existence, who are, nevertheless, quite happy.

Many people have unfortunate dispositions, and seem to think that it is something that cannot be changed. Very often they are morbid, suspicious, do not mix well, and seem to think that everyone is against them. They brood over trifles and fancied insults. This condition, if persisted in, leads to insanity in many cases. Everyone should have his work relieved by healthy interests and activities aside from his work. Work should be relieved by proper periods of rest and simple pleasures and interest in the affairs of others. People should face situations frankly. If they have a difficulty with one of their fellows, they should go to him and discuss it freely. If they have a difficulty with a superior officer, a frank talk with him will often relieve their minds of the suspicion that they have been unjustly dealt with. The superior officers are not devoting their time to the hounding of any one individual, because their time is sufficiently occupied with more important matters. Very often, we, as individuals, hitch our wagons to stars and long for things that are not immediately possible. Often we are inclined to "day dream" and to feel dissatisfied with our lot in life. It is far better to try to be satisfied with what we have and by hard work and study to prepare ourselves for higher responsibilities and for promotion when the time comes.

SEX PROBLEMS.

Sex problems are very often the cause of nervous breakdowns. It is the conflict and worry over these problems which is the cause of all the difficulties. Sex as a cause for insanity or nervous diseases has been very strongly over-emphasized, but it is undoubtedly a very important cause. Parents should instruct their children when the proper time comes, as to the nature and dangers of sex, and not allow them to secure this information from the streets and from improper companions. People should realize that sexual desire is a normal physiological function given to us for a definite purpose, but one which can be abused and through its abuse venereal diseases acquired and even insanity developed. People should seek advice from the proper sources regarding sex problems.

INHERITANCE OF INSANITY.

People are generally inclined to think that insanity is directly inherited, but this is not strictly true. The tendency toward it may be inherited, but the fact that some of our relatives developed insanity does not mean that we will have to suffer from it ourselves. Persons in whose families there have been a number of cases of insanity, should be particularly cautious about their mode of living, build up healthy habits, and avoid undue strain and worry. In this way, a nervous breakdown may be prevented.

There are various clinics in New York City where persons who believe they are suffering from nervous conditions or impending insanity, may receive competent advice, free.

STATE HOSPITALS.

There are thirteen State Hospitals in New York State where mental conditions are treated. Many people regard these institutions with suspicion, but anyone who has had experience with them, knows that these institutions are doing everything humanly possible to cure the inmates. The State Hospitals have nothing to gain by retaining individuals in the hospitals. They are only too glad to discharge patients as soon as they feel that they can get along in the community. Under the existing laws of New York State it is impossible to railroad a person into a State Hospital, and if this has happened in the past, it has been through the misrepresentation of facts.

Nervous conditions very often manifest themselves in physical conditions, for instance, vomiting, weakness of an arm or leg, disturbance in walking and in many other ways. This fact should not be lost sight of in seeking a nervous cause for physical symptoms nor should it be lost sight of that purely psychic factors may cause physical manifestations. Mental conflicts, that is, worries of various kinds, are more easily referred to as physical symptoms, more easily spoken of when the real cause of the difficulty is repressed. Many of the milder forms of nervous disease express themselves in this way and much time and expense will be saved if this fact is promptly realized.

* * *

Posture and Feet

BY WALTER TRUSLOW, M.D., BROOKLYN, N.Y.

NO chain is stronger than its weakest link. In this chain testing, which you of the Second District Dental Society are making, I call your attention to the importance of the human framework link.

RESULTS OF EVOLUTION.

As we have attained, through evolution, to the position of "up-ender" animals, we are obliged to conserve the supporting column and the complicated and easily deranged base. What have we gained in attaining uprightness? What are its weaknesses?

Well, we have attained relative height and an over-ruling position of the head, with its supervising mechanism. We have freed the arms and highly developed hands, from the functions of locomotion and weight-bearing, thus furthering their manifold usefulness. We

have gained a quickness and accuracy in turning the body by cutting down the four-pedestal support to the highly-trained and relatively-strong two-legged members.

On the other hand, we have to combat inherent weaknesses incidental to the upright position. The total body weight, no longer distributed on four feet, must be borne by two. These two halves of the base support have a double function—simple weight-bearing and locomotion. Because of the arches of the feet (the long planter and the short transverse in the front), weight-bearing is an inevitable strain; but because of the arches, locomotion and much mobile facility, as in running, jumping and dancing, is furthered. The knee mechanism is admirably adapted to weight-bearing in the upright position. Specially broadened bone-ends rest one above the other, in a stable position; strong ligaments and muscles hold these bones perpendicularly. But the knees are liable to strain in complicated movements. The hip joints, and the position of the pelvis upon the thighs, are well modified and adapted to the upright position. In the trunk, we have distinct elements of weakness. The spinal column, at its lower end, is mortised in between the heavy hip bones. When upright trunk positions are maintained, this relationship is stable. If there are habitual saggings of the trunk, the rear pelvic joints are loosened, causing much pain and disability. The abdomen has a strong bony column at the rear, but its heavy contents must be held at the sides and front by a yielding muscular wall. If the tone of this muscle tube is not kept up, bad sagging occurs, leading to poor posture and the long train of bodily ailments which follow in its wake. The head is heavy and tends to droop forward. If this is not combatted, by keeping up the strength of the neck and upper back muscles, there follows round back and round shoulders, with their embarrassment of chest action and lessening of lung function.

These are weaknesses inherent in our framework, incident to our upright position. Because of these weaknesses, the maintenance of good posture, or the keeping of the superimposed body segments reasonably within the line of gravity, and the hygiene and care of our feet, is an obligation we must all face. The young must be trained to it; and in adult life *we must maintain it*.

There remains only to inquire what, in the dentist's life tends to augment these weaknesses and how should they be dealt with.

1. FEET.

Dentists stand at their work rather more than do those in many other occupations. They are therefore putting much strain upon their feet. Is it necessary to stand the long hours you do? Can you not use the high lunch counter stool? Proper shoes must be worn; shoes with a good firm heel, an unyielding shank and allowing ample

toe room with ample vamp and soft uppers. Even men are guilty of trying to put a "quart" foot into a "pint" shoe. Oxfords are rather better for the feet than high upper shoes, unless inclement winter weather causes one to prefer the high shoes at that season. Simply tired feet are well cared for by hot and cold water contrast baths and by simple ten-minute-a-day exercises. If real pain exists, the specially-modelled leather-covered sponge rubber insole braces are good supplements to the firm shoe supports. The store-bought foot braces are rarely adequate—they never support the front arch, just back of the toes. Few should contemplate permanent use of foot braces; but to those who need them they are valuable aids to comfort and usefulness, and the wearer should learn when not to, as well as when to, use them. Some feet require much more special care than is here outlined.

2. THE SPINE AND ABDOMEN.

The positions of the trunk, which a dentist habitually assumes at his work, tend to augment the weaknesses noted in this region. Again, is it necessary to bend and twist the trunk as much as the writer has observed in some of his dental friends? And if it is necessary, can he not combat the tendencies of faulty positions by frequent definite, purposeful straightening up and stretching? It would be very valuable to get the habit of a half minute, taken between each patient, in standing erect, drawing the shoulders back and the abdomen in and taking five deep breaths with arms at "wind-mill"—that is raised forward upward, with intake of breath, and sideways downward with respiratory expiration. Then, too, we must all combat the tendency to "aldermanic corporations." Scarcely anything is easier to acquire in sedentary occupations, and nothing is more conducive to bad posture, with its resulting constipations and respiratory embarrassments, than the "not lost but gone before" condition of our middle front. The habit, which many of you are acquiring, of taking a day, or a half day, for exercise, is admirable. "Eat less and exercise more or bust."

3. SACRO-ILIAC JOINT STRAIN.

I believe the dentist more liable than the average man or woman, because of his occupation, to low back strains, which we now locate more frequently in the rear pelvic or sacro-iliac joints. When this is present, it can be cared for, in most cases, by simple pelvic strapping, perhaps followed by a specially made pelvic belt. It is a trying and painful condition and often requires careful study.

This short paper points out weaknesses inherent in our having attained the upright position; it shows what the dentist is liable to because of them, and endeavors to show how some may be prevented and others cared for.

The Diagnosis of Common Skin Diseases

BY GEORGE CLINTON ANDREWS, M.D., NEW YORK CITY.

IT is quite difficult to give, in fifteen minutes, very much concerning skin diseases, because they cover a large field. What do they comprehend? There are the dermatoses of internal metabolic origin, such as eczema, and also those due to systemic bacterial infections, such as tuberculosis, syphilis and leprosy. There are also many caused by infection of the skin, by various microorganisms, or animal or vegetable parasites, such as furunculosis, scabies and ringworm. In addition, there are the various neoplasms, benign and malignant.

The diagnosis is made largely from the distribution of the eruption, as certain diseases affect principally certain locations, and from the clinical appearance of the individual lesions. Some diseases affect frequently the buccal cavity, and in these I know you are most interested.

MUCOUS PATCHES.

The mucous patches of syphilis are most infectious lesions, and are very common and very innocent-looking spots. They are grayish white, moist and superficial; somewhat resembling canker sores, although the latter are more virulent in appearance. Canker sores are red and painful, whereas mucous patches are not. Mucous patches have a glairy surface, and at times look like cracked lips or fever sores. Primary lesions of syphilis occur also on the lips and in the mouth, but less frequently than the mucous patches of the secondary stage, and are usually less infectious. The primary lesion is frequently hard and might be mistaken for a cancer.

Drugs taken internally produce skin eruptions, and the lesions of these eruptions sometimes resemble infectious diseases. Certain laxatives cause mouth lesions which may be ulcerations. Other drugs taken internally may have similar effects, especially bromides and other sedatives.

CANCER.

Cancer is prevalent on the lip, tongue and buccal mucous membrane, where it is frequently preceded by leucoplakia. Cancer of the lip is frequent among men, and very rare among women. Probably it will be seen in women after a few years, but they have not yet been smoking long enough. Pipe-smokers are more subject to it than are cigar-smokers, because they carry the pipe always in the same place.

It begins as a little lump in the lip. Any cracked lip which persists for over six months is suspicious. If it is firm and indurated, it is very suspicious. It is well for all men to know this, and the American Red Cross and the Cancer Campaign are doing a good work

in training people to look out for these early malignant conditions. It is a small spot when it begins, a microscopic spot, and it can be cured by any destructive measure. Because it is often not recognized, such treatment is not given until the disease has spread and becomes impossible to cure.

NOVOCAIN DERMATITIS.

We see occasionally a case of novocain dermatitis on the hands of dentists, although it is not common. It is very difficult to desensitize people who have this proclivity. I have tried to desensitize dentists by small doses of novocain, without success. It is necessary for susceptible individuals to avoid the drug. Novocain dermatitis begins with itching and an erythema, usually on the dorsums of the fingers or on the webs. Soon little vesicles appear and later, crusts. The eruption may spread to the face, or even become generalized. X-ray treatment and soothing lotions are the best form of treatment.

Fever as a Blessing

THAT the high temperature of fever is simply a reflex action having for its object to speed up the production of disease-quelling elements in the blood, and hence that it is not desirable to oppose it, is the belief of a recent British experimenter, Dr. Heath, whose work is reported in *The Lancet* (London).

“Long before the introduction of the clinical thermometer the meaning of fever was one of the most intriguing problems exercising the mind of the physician, and even when it became possible to measure its degrees with accuracy but little light was thrown upon the matter. For many years a heightened temperature was regarded as evil in itself—very much as a heightened blood-pressure quite usually is now—and in the treatment of febrile conditions the main line of attack was directed toward its reduction.

“Experience of antipyretic drugs led to some doubts as to the actual benefit to be expected from a mere lowering of temperature, and experimental work showed that in infectious conditions some degree was certainly beneficial; animals kept at fever heat were able to withstand infections fatal to normal controls. The light-hearted use of antipyretics does not now hold a place in therapeutics, nor is the degree of fever looked upon to any great extent as an index to the gravity of the condition; none the less the why and wherefore of fever remains almost as much a mystery as ever.

“Some little light has been thrown upon at least one aspect of the subject by Dr. Oliver Heath in two communications recently made to the Royal Society of Medicine. Working partly upon himself with typhoid vaccines and partly upon typhoid patients, Dr. Heath

has been able to obtain results indicating in a very clear and unequivocal manner that the course of fever runs parallel to the reduction below normal of antibody in the blood.

"Thus, on administering subcutaneously to himself 2,000 million killed typhoid bacilli, he found that a rise of temperature to 100° F. was synchronous with a very considerable drop in the bactericidal power of his blood; the return of the temperature to normal on the day following the injection was associated with a restoration of the normal bactericidal power. Inoculation of doses of dead typhoid bacilli on ten successive days likewise produced irregular pyrexia, associated when the dose was sufficiently large with a demonstrable fall in the bactericidal power of the serum.

"Numerous other observations are recorded, all going to show that fever is always associated with a reduction below normal of antibody in the blood. This, in itself, is a valuable observation. Dr. Heath interprets his evidence to mean that this reduction is the actual cause of fever, and that the heightened temperature may be looked upon as in the nature of a reflex designed to speed up the production of more antibody to replace that used up. On the evidence Dr. Heath seems justified when he recommends that the use of drugs for the cure of fever should be discontinued."

Success in Full Denture Construction

JOHN B. LADUE, CHICAGO.

SUCCESS in any line of endeavor depends entirely upon our own efforts, and the degree of success is judged by the standards we set up to attain. If we are engaged in the practice of dentistry merely for the means of livelihood and our main idea is to just get by, a little thought along this line might be a good thing.

In a majority of practices full dentures occupy the place of a filler-in, just the something that helps to build up a mass of practice. Many men do a very creditable class of dentistry until it comes to denture work, which they shove through in a sloppy, careless way, putting the burden on the adaptability of the patient. If trouble results then denture work becomes a bugbear.

If we wish to practise the golden rule we will first try to learn to do a thing properly and then apply ourselves to the carrying out, in detail, of our teachings in every case. It has been said that "the things that we like least are those that we know least about." It naturally follows that unless we enjoy doing a thing it is rarely well done.

There is no patient who is more deserving of the best we can do than the edentulous patient. I know of no greater incentive, in the

practice of dentistry, than to strive to build a set of dentures that will bring comfort, health and happiness to patients who have been so unfortunate as to lose their teeth.

The three important results that we hope to obtain in denture construction are comfort, appearance and efficiency. Of these, comfort of course is most important, for without it neither appearance nor efficiency are possible. It is impossible to look pleasant when one is in pain, and efficient mastication it not done when the act is painful. To a great many patients appearance is even more essential than is efficiency. While it sometimes is necessary to sacrifice one for the other, ordinarily it is possible to achieve results that are satisfying from both standpoints.

It is recognized that the end-results depend greatly upon the co-operation that the patient gives the dentist. This co-operation for the major part depends upon the education of the patient by the dentist. Every edentulous patient has ideas as to his or her ultimate success as a wearer of dentures. This is based on the experience his or her relatives or friends have had. The operator should be able to recognize the physical conditions that present which tend to limit the result, and an explanation should be given the patient in terms that are understandable to the lay mind.

When we appreciate that the efficiency of the highest type of artificial dentures does not exceed 40 per cent. of that of natural dentures, we realize how easy it is to promise more than we can deliver. This is the one best bet to produce a dissatisfied patient. Always try to hold something in reserve, so that you may have a chance to deliver more than is promised.

A fee should be charged that is commensurate with the services rendered. Things in general are apt to be appreciated in ratio to their cost. For instance, you often hear a man elucidate the qualities of his expensive car, but rarely those of a flivver. One of the most essential points from the business side of denture construction is to make sure that the dentures are paid for when delivered. When a complaint is made by a patient who has paid in full you may rest assured that the kick is legitimate. Otherwise you will do considerable wondering.

As to the technical procedure of construction there are many ways of making dentures, but all have practically the same basic principles. Some men prefer one technique and some another, but close application to any one will bring you approximately to the same successful end. It is a series of details each of which is essential in itself. You must have some mechanical ability, some artistic ability and the ability to judge human nature. It's the doing of the same thing all the time with variations, and he who handles his variations best has the most success:—*Dental Forum*.

The Ideal Tooth*

SIR ARTHUR KEITH, M.D. ABERD., F.R.C.S. ENG.

ON a recent occasion I had the pleasure of listening to an address given by an eminent statesman to an audience made up, for the greater part, of medical men. He was in the happy position of being able to say that at no point of a long and busy life had he required help from either physician or surgeon. Such an experience must be exceptional; few men and women do reach the age of 70 without calling for medical aid. I should think that ninety out of every hundred have settled, or should have settled, several doctors' bills before reaching the age of 70. The statesman said nothing of his teeth, but if he reached the age of 70 without having to seek the aid of a dental surgeon, then his lot was better than falls to 999 out of every 1,000 septuagenarians. If we were to make a survey of the dental conditions which prevail at the present time in Great Britain, confining our attention to the mouths of men and women of the age of 60 and upwards, I do not think we should find even one in a thousand who retains a full undamaged outfit of teeth, and who can boast that on no occasion has there been need of dental aid. I think that a strict survey would show us that, as a general rule, we have to visit our dentist five times for every occasion we have to call in medical aid. It would appear, then, that of all the structural systems which make up that wonderful piece of machinery of the human body, the dental system is that which is most liable to break down.

NATURE AS DESIGNER AND WORKMAN.

There was a time when the design and workmanship of our bodies commanded the unstinted admiration of anatomists. In these modern times, however, there has arisen a critical school, founded by the late Prof. Elie Metchnikoff, which calls in question both the design and workmanship of the human body. Metchnikoff held that there were glaring imperfections in the contrivance of many of its parts. He cited as an instance man's great bowel, in which are included both cæcum and appendix. He held that, so far as modern man is concerned, the presence of a great bowel was a mistake; it merely served as a filth sink; it was a constant menace to health and the cause of misery in untold millions of lives. If a liability to become disordered, to become the seat of pain and a source of misery, is a reliable index of imperfect design and workmanship of an organ or of a system of organs then Nature's attempt to fit modern man with an efficient dentition is an utter failure. I am putting the matter from a Metchni-

*An address (abridged) delivered at the Royal Dental Hospital, London, on the opening of Session and Presentation of Prizes, October 1, 1924, and published in the British Dental Journal.

koffian point of view; as will be seen in the sequel I hold a brief for Nature—both as a designer and workman.

It is far from uncommon to meet with men and women who in their sanest and soberest moments, when their judgments are undisturbed by pangs of pain, give utterance to the conviction that Nature's "teeth are more bother than they are worth." They are convinced that it would be better for human health, happiness, and efficiency if our jaws retained the edentulous condition of birth and that we should be better to depend, from infancy to old age, upon artificial dentures than on Nature's efforts. Such critics are prepared to pay golden guineas for artificial teeth rather than accept Nature's two sets as a free gift. Yet, on the production of these two sets—a milk set of 20 members and a permanent set of 32—52 all told—Nature has lavished her ingenuity to the utmost. It would be strange, indeed, if Nature, after spending millions of years in perfecting her dental handiwork should now turn round on modern man and undo in his body her endless endeavors to reach perfection. Is it possible that city-living man is doing something which frustrates her best efforts to give him a healthy body?

DISHARMONY BETWEEN STRUCTURAL OUTFIT AND CIVILIZATION.

Those who criticize Nature's dental workmanship can cite many pieces of evidence in support of their contention. They may instance the baby fretting, slobbering, restless, as it cuts its first teeth: why should the eruption of teeth be attended by pain? Then, when the milk teeth have cut and are in use, half of them, before they have done their full duty, become the subjects of caries. The teeth, which we ironically name "permanent," render their owners open to many kinds of trouble. When they cut they may find the jaws too small to give them a place in a regular series; upper and lower teeth may be so badly placed that they fail to make proper contacts in the acts of biting and chewing. When the "permanent" teeth have come into use, half of them fall victims to caries before the age of 50 is reached. If they escape caries they may fall victims to pyorrhea. The four final molars—the wisdom teeth—may be suppressed altogether, or if formed they may fail to erupt or erupt painfully long after youth is past. The rarest sight in modern mouths is a tooth worn to its neck from use. When modern man enumerates his dental woes, it is clear that either Nature is neglecting him or he is neglecting Nature. On whichever side the fault may lie there is, without doubt, a grave disharmony between the structural outfit of man's body and the conditions with which modern civilization has surrounded it.

THE FUNCTION OF THE PULP.

In our search for an ideal dentition, then, we cannot conceive any better than that invented by Nature. Can we suggest any improve-

ment in detail? The first which occurs to us is to get rid of the pulp and of the pulp cavity. This is exactly what the dentist does when caries has eaten into the heart of a tooth and set up intolerable pain. Why has this operation not been forestalled by Nature? I have before me now the jaws of men who lived in Babylonia some 6,000 years ago. The crowns of the teeth are almost worn away from use, and yet the pulp cavities are not exposed; as erosion wore the crowns down, the odontoblasts of the pulp laid down secondary dentine until the cavities became obliterated. Why do these dentine builders need the pressures and strains of use to set them to work? Why are the teeth furnished with pulp? The answer is that a tooth is a living thing; every element of it needs nourishment—even the enamel prisms. The pulp is Nature's means of keeping the tooth flooded with the elements needed for the sustenance of life. If the cavity of a tooth is filled then all the nourishment which can sustain a tooth has to reach it through the periodontal membrane. A stopped tooth is not a dead tooth, but it is one which is imperfectly nourished, unfit for hard wear, and liable to atrophy and to infection. For the full health of a tooth, a pulp cavity is a necessity. Odontoblasts are sensitive to wear and react by the formation of sound secondary dentine. But Nature has not discovered a method of making them react to the insidious invasion of caries. If Nature is put to it, I dare say she may discover a method of arresting invasion of caries by the formation of secondary dentine. Meantime it has to be admitted that she has not made this discovery, and that with the death or destruction of its pulp a tooth loses its full condition of health.

THE NERVES OF A TOOTH.

Why should teeth be so richly supplied with nerves? We know the curse these nerves bring to us when teeth become diseased, but where is the blessing which should accrue to us from this rich nerve-supply in health? It does not seem to me we give a satisfactory reason for the presence of such nerves by saying that they are protective—that a sensitive pulp prevents us from neglecting or from abusing our teeth. Sir James Mackenzie holds that pain when it occurs as the result of disease, is usually a manifestation of a disordered reflex. What reflexes could be centred in or round a tooth? One can conceive, although there is no evidence on the point, that end-organs or receptors of reflexes which regulate the muscles of mastication may be situated in the periodontal membrane, but one does not expect such receptors to occur in the pulp cavity. Yet they may, for when we bite or chew hard or tough substances there must be a certain degree of deformation of the tooth and of the pulp cavity, and such deformation may be registered by nerve terminals in the pulp. At present if a tooth is to be healthy and durable it must have a pulp, and if it is

furnished with a pulp, then it must be provided with nerves and the price of nerves is a liability to pain. If we accept Nature's dentition, we must be prepared to purchase its overwhelming benefits at the risk of suffering.

NECESSITY OF STUDYING NATURE'S METHODS.

In our search for an ideal tooth for modern man we cannot conceive anything so good as Nature's best. We cannot suggest any improvement in her designs, materials, or manner of production. Why, then, should she serve modern civilized man so indifferently while the wild apes of the jungle enjoy her superior workmanship? The apes' teeth, so long as they live their natural lives, are almost proof against pyorrhea; not absolutely, but nearly. It is only when the crowns are worn down and the formation of secondary dentine is inadequate that they become liable to gumboil and root abscess. Yet they never brush their teeth; their children attend no dental clinic. Whereas we poor human beings, take what pains we may, find ourselves the subjects of the grossest forms of dental disorders. Is it that Nature is really scamping her work so far as the teeth of city-living man is concerned, or is it that city-living man in his ignorance is not supplying Nature with the materials—or materials in the proper ratio and condition—out of which she has been accustomed to fashion teeth? Discoveries which have been made by Dr. and Mrs. Mellanby seem to show this is the case. We are supplying the clay and withholding the straw which she needs for the fashioning of her dental edifices. Our bad teeth are not due to Nature's bungling, but to our ignorance of her ways. If we are to have sound teeth we have to study Nature's methods with infinite patience, and humor her by supplying the materials and conditions under which she can do her best work. Even human workmen demand such terms.

It is often said that degeneration has overtaken our teeth because we do not use them as early man did. It is most probable that use and wear harden the texture of the tooth, for teeth are living things, and all living things react to use. Use may be a condition of preservation of the fully erupted tooth, but I do not think that lack of use through countless generations has caused the reduction in the size and number of teeth in modern man. Since her very earliest endeavors to fashion mammalian teeth Nature has brought them into use after their chewing parts were fully formed; if there was inheritance of the effects of use, crowns should be formed with their tips worn off. The units of a dentition are assembled just as are the units of a motor-car—all fully finished and ready to fit into place before they are ever put in movement. Tooth after tooth erupts to find perfectly fitting opponents ready to come into contact with them. We do not know the machinery which Nature uses to co-ordinate the parts of her dental mills, but it is certainly not the mechanical one of usage.

AN OBSCURE MECHANISM.

There is some mechanism at work in the human body which tends to weaken the jaws and teeth as it strengthens the powers of the brain. The exact nature of this mechanism remains obscure. One could conceive a developmental correlationship between brain and teeth—one which exercised a restraining influence on teeth as it favored an increase of brain. One, however, is tempted to suppose that the reduction of the teeth has not been brought about in this way, but by the increased powers of the brain altering the conditions under which the development and growth of man's body takes place. The discovery of fire and of cooking must have wrought a revolution in the conditions of human life—and subjected the teeth and the whole alimentary tract of evolving man to a new set of conditions, demanding fresh adaptations. We do not know at what period of man's evolution the discovery of fire was made. In Rhodesian man, one of the most primitive and simian of human types yet discovered, massive robust-looking teeth are ravaged by caries and dental abscess. His remains lay in the utmost recess of a great cave which was chokeful of animal bones—apparently the residue of human feasts. It does not seem too much to suppose if we are to account for the condition of the teeth of Rhodesian man, that he was suffering, just as we are, from the early experience of new conditions. Had he learned the secrets of fire and been seduced into the use of cooked food? Perhaps, like us, he blamed Nature for his misfortunes.

CONCLUSION.

Thus our search for an ideal dentition leads us to the conclusion that the best conceivable, the best obtainable, is that which Nature has to offer every one of us. Only we must realize that she lays down conditions—conditions which have to be discovered as well as accepted and observed. We have to abandon our present mood—the Metchnikoffian mood—in which we lay down conditions which we expect Nature to observe. We expect her to keep up the standard of her dental workmanship when we swamp our own bodies, as well as the developing tissues of the foetus, and infant, with substances she finds difficult to handle and utilize. We demand that she will adjust at once her adaptational machinery to our new modes of living and blame her when she fails to respond. It is all so childish and so unreasonable! All she asks of us is that we shall understand the method of her workmanship and the materials which she requires in the fashioning of teeth. And if we patiently apply ourselves to her behests I, for one, believe she will give us the dentition we deserve.

ORAL HEALTH

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EDITORIAL



Oral Health

Extends to Its Readers

Cordial Season's Greetings and

Best Wishes

For the

New Year



The Proper Legal Duties of the Dental Nurse or Assistant

THE Dental Hygienist who, now, is a recognized factor of the dental profession in parts of the United States, has not as yet invaded Canadian territory. Some years ago this subject came up for serious discussion, more particularly in the Province of Ontario. It was then decided that a properly educated and trained dental as-

sistant would solve the problem of proper office assistance more satisfactorily than the dental hygienist.

To this end a course of instruction was inaugurated by the Royal College of Dental Surgeons of Ontario, which aimed at giving a practical training sufficient to equip the candidate to properly take her place as an intelligent and efficient assistant in the office of the busy practitioner. Successful graduation from this course of instruction gave the candidate the title of Dental Nurse.

To state as concisely as possible the legal status of this Dental Nurse is the aim of this editorial.

It should be constantly kept in mind that the Dental Nurse must act only in the capacity of an *assistant* to the dentist and never to undertake anything that could be construed as practising dentistry.

Also this well-established law should be clearly understood by both the dentist and his assistant, namely,—that the dentist is not only liable for his own mistakes and acts of carelessness, but also for those of his nurse or any other party associated with him in the conduct of his practice.

It is just a question whether the average practitioner is fully aware how much he is dependant upon the integrity and efficiency of those assisting him or associated with him in his professional duties.

If there is any calling that demands a high degree of accuracy, honesty of purpose and efficiency, it is that of the Dental Nurse. The possibilities of serious mistakes are constantly at her elbow, lurking as they do in the handling of drugs, sterilizing of instruments, the carrying out of office details, etc.

Indeed it would seem that the Dental Nurse in the busy office is carrying a responsibility upon which largely depends the professional reputation of the dentist himself.

Apart from this phase of the question, however, is the equally important one of how far the Dental Nurse may go in the performance of her duties and not be guilty of practising dentistry.

Here it should be constantly kept in mind that the proper field of her duties is strictly limited to assisting the dentist in the care and treatment of his patients, in addition to her other duties in the office. On no occasion should she attempt any operation in the mouth, however trivial. That would be practising dentistry. Nor should she on her own responsibility give any advice to the patients as to the care of the mouth in a particular case, or as to the particular mouth wash or dentrifice that should be used in a particular case. That also is practising dentistry.

To sum up what a Dental Nurse may or may not do and keep within the law may concisely be put as follows:

A Dental Nurse may assist the dentist in the performance of his professional services to his patients, and may undertake any of the business or any such duties pertaining to the practice.

But the Dental Nurse *may not* perform any operation upon, render any professional services for, or give any professional advice to any patient on her own responsibility.

In short, the Dental Nurse must not undertake anything in the dental office that could legally be called practising dentistry.

R. G. McL.

Editorial Note

THE Editor regrets that in Dr. McDonagh's discussion, which appeared in the last issue of ORAL HEALTH, the author's corrections of the stenographer's notes were not made. The changes were duly received and were forwarded to the printer in the regular way, but unfortunately were misplaced and were not included in the published discussion.

Dr. McDonagh, at our request, has kindly consented to prepare a more complete paper for publication, and it is our hope that this new manuscript may be available for an early issue of ORAL HEALTH.

Dr. Fulton Risdon Honored

AT the meeting of the Oral and Plastic Surgeons of America, held in New York on October 20, Fulton Risdon, D.D.S., M.B., F.A.C.S., was made President-elect for the ensuing year.

Dr. Risdon is a member of the staff of the Toronto General Hospital on the service of Dr. Perry Goldsmith,—Ear, Nose and Throat,—holds the Chair of Surgery in the Royal College of Dental Surgeons, and is Consultant to the D.S.C.R. in Reconstruction Surgery.

The Dentists' Legal Protective Association

THIS is the period of the year when every Dentist in Ontario should be assured his name is enrolled as a member of this important organization.

At this particular time in the history of Dentistry, when charges of malpractice are becoming so numerous and menacing, no Dentist in Ontario, wherever he may be located, should be without the legal protection that this Association offers to him.

The fee is only three dollars per year. For this nominal sum the Association undertakes to defend all those unjust and frivolous charges that are apt to be launched against even the most skilful and careful practitioner.

Send your fee to the Secretary-Treasurer, Dr. W. E. Willmott, 240 College St., Toronto, and a certificate of membership will be mailed to you.

R. G. McLAUGHLIN, President.

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